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ARCHIVES OF OTOLOGY.

PRIMARY MASTOID PERIOSTITIS.

By Dr. S. C. AYRES, Cincinnati, Ohio.

CASES of primary mastoid periostitis are so rare that I take the liberty of presenting two cases which have come under my observation. The first one is as clear-cut, well-defined, and uncomplicated a case as could be asked for by the most skeptical. It occurred in the person of an educated gentleman who gave a clear history of the trouble from its incipiency. The second case was in the person of a servant girl, and it is probable that she had had an otorrhœa previous to the attack of mastoid periostitis.

Case 1.—D. McD. was first seen March 4, 1887. At that time there was marked swelling over the mastoid region of the right side. There was some misplacement of the auricle forwards, and great tenderness to pressure. The mastoid region had been painful for six weeks, during which time it had gradually grown worse. The drum-membrane was injected, there was no obstruction in the Eustachian tube, and air passed freely. He had had no otorrhœa recently, nor had he ever had any within his recollection. The region around the insertion of the sterno-cleido-mastoid muscle was particularly sensitive.

I advised a deep incision through the periosteum upon the bone, as the only means of giving him relief and preventing suppuration, which was sure to come in time. This he seriously objected to, and went home contrary to my advice.

Eleven days later he returned with the report that the inflammation had steadily increased, and that he was now ready to submit to the operation which had been proposed before.

There was obscure fluctuation over the mastoid, and the auricle was more displaced forwards than at the first visit. I made a long and deep incision over the bone, and evacuated a large amount of

pus. The bone over the mastoid was denuded of periosteum, and I was able to pass the probe into the cells after the operation.

At this time the drum membrane was much more injected than at the previous visit, but the meatus was dry, and there was no symptom of otorrhœa. His hearing, which at the first visit was perfect, was now slightly impaired from the hyperæmic condition of the drum-membrane.

After the incision the inflammation subsided rapidly, and in a few days suppuration had practically ceased. His hearing was now as good as ever. I saw him a year after the above inflammation, and his hearing was then perfectly good, and there has been no return of the inflammation.

CASE 2.—My second was in the person of a girl about twenty years of age. She had suffered for some weeks with tenderness in the mastoid region, and for two weeks past the pain had been so severe that she was confined to her room.

Upon examination I found an enormous swelling over the mastoid with distinct fluctuation. The external meatus was dry, and there had been no otorrhœa. There was, however, a history of otorrhœa dating back some time, but at the time I saw her there was none.

Her hearing was impaired, and the drum-membrane presented a dull appearance. I at once advised an incision down upon the bone, to which she consented. The relief which this gave was prompt and permanent. The inflammation subsided rapidly, the pain was relieved, and in a short time the suppuration ceased. I saw her only three or four times when she disappeared from my observation.

In the "Transactions of the Ninth International Congress" is a paper by Dr. Jno. F. Fulton, of St. Paul, Minn., read before the Section of Otology, on "Acute Primary Inflammation in the Mastoid Cells." He refers to the rarity of the disease, and to its striking symptoms. He says that the pain is very violent and constant, that it extends downward to the neck and shoulders, and upward to the temples and the eyes. He further says that they occur without any aural complications, and no external manifestations until late in the course of the disease, when swelling and tenderness over the external mastoid are apparent.

He instances two cases, in one of which there was an abcess in the mastoid cells, and in the other there was a sclerosing process. In neither was the sound-conducting apparatus involved, nor was there a swelling over the mastoid region. Both cases made an excellent recovery after opening of the mastoid cells.

In vol. viii., ARCHIVES OF OTOLOGY, 1879, Dr. David Webster reports three cases. In the first case, the swelling of the mastoid preceded the suppuration of the middle ear. There was marked infiltration into the tissues over the mastoid, and a perforation of the drum-membrane before the operation on the mastoid.

In the second case, there was also very great swelling over the mastoid region, and nearly complete closure of the meatus from extension of the inflammation to it.

In the third case, the drum-membrane was intact, but there was a small granular mass on the upper and posterior wall of the meatus, showing the point of communication with the mastoid cells.

In vol. ix. of the same, Dr. Roosa reports a case of abscess of the mastoid where there was not the slightest evidence of any congestion or inflammation of the external auditory canal or middle ear.

Dr. Buck, in his excellent "Manual of Diseases of the Ear," says, on page 307: "I have never seen any thing I could consider as a primary idiopathic mastoid periostitis, although such a disease has been described by different writers on otology."

Hartmann, in "Diseases of the Ear," says: "Abscesses upon the outer surface of the mastoid process without disease of the middle ear, have generally been described as acute periostitis. If not incised, they may make their way into the external meatus." He further states, that Bezold, in *Deutsche med. Wochenschrift*, No. 28, 1881, has described a new and peculiar form of inflammation of the surface of the mastoid process, involving the insertion of the sterno-cleido-mastoid muscle, but he does not describe it as a mastoiditis.

Turnbull, in his work on "Diseases of the Ear," reports

from some cases of abscess of the mastoid without discharge the ear.

Politzer says that "periostitis mastoidia is extremely rare, and there are only a few cases to be found in literature." He refers to cases by Voltolini, Blake, Knapp, Jacobi, Hotz, and others.

CONTRIBUTION TO THE STUDY OF ANÆSTHESIA IN SMALL SURGICAL OPERATIONS; COCAINIZATION; ELECTRICAL CATAPHORESIS; HYPNOTISM AND SUGGESTION.

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Translated by Dr. Max Toeplitz, New York.

(From a paper read before the sixty-first meeting of German naturalists and physicians at Cologne, September 18, 1888.)

COCAINE, apart from its anæsthetic effect, has been recommended therapeutically for chronic swelling of mucous membranes. Results of this treatment have, to my knowledge, not been reported, although a sufficient number of patients, afraid of any kind of operations, willingly submit themselves to such experiments. For this reason I bring this subject before the profession. When cocaine was first introduced, I prescribed it frequently as a snuff of one per cent. strength for chronic swelling of the nasal mucous membrane. In this concentration it still has a good effect, unless it is used too frequently. When used longer the treatment tired the patient or the physician, so as not to lead to results that might have proved satisfactory, I finally resorting to more reliable remedies. I had of late an opportunity of making an observation of this kind. A colleague for months had applied to his nose, on account of an extreme nasal catarrh, every day, and even several times a day, cotton plugs saturated with a ten per cent. solution of cocaine. In the beginning he was relieved thereby, but this soon ceased. The patient has lately observed that the sensations of general uneasiness, frontal pres-

sure, tendency to sneezing, want of sleep, are exasperated by the cocaine. In spite of repeated swabbing of the nasal mucous membrane at the first examination with a twenty per cent. solution of cocaine, the mucous membrane neither markedly decreased in swelling nor did it become anæsthetic. The remedy had a better effect upon the mucous membrane after an intermission of a few days, without application. I believe that after such experience cocaine cannot be recommended for continuous local treatment in chronic inflammation of mucous membranes, as little as for internal medication. *It retains, however, its permanent value for local anæsthesia, for reducing a swelling, for diagnostic and therapeutic purposes, especially in the nose, and eventually as a palliative measure in acute irritation and inflammation.*

If the use of cocaine in regions adjoining the ear is widely spread, its employment in otology is, I regret to say, very much restricted, since according to our experience it has a sure effect, save upon the mucous membrane, only upon places denuded from epidermis. It cannot be used in a number of operative procedures that are quite painful to the patient, such operations as, *e. g.*, paracentesis of the drum-membrane, superficial and deep incisions into extreme swellings of the external meatus, and Wilde's incision. I have tried in such cases electrical cataphoresis, which, first published by Wagner, has proven to be so satisfactory to me in its results as to warrant its recommendation for general use. I used for this purpose the eight to ten per cent. solution of cocaine, which I invariably apply for local anæsthesia, on cotton, connected with the positive pole, which was permitted for fifteen or twenty minutes to act upon the place to be anæsthetized. The negative pole was placed upon the nape of the neck. The current was produced by four to ten Glauert's (Spamer's) elements, according to how recently the apparatus was filled or to the sensibility of the patient. For applications to the ear I simply rolled some cotton around the wire point, which is screwed for other purposes into the handle of the positive electrode, using it like a cotton carrier, and introduced it into the external auditory meatus. We ought not to omit to protect the ex-

ternal portion of the meatus by cotton against the direct contact of the wire with the skin.

I have thus succeeded in making, in a boy, six years of age, a long incision through an almost healthy drum-membrane, without a movement of the child. A man, æt. forty, heard the paracentesis, but he did not feel it. Both drum-membranes were implicated in this case, in which I had expected more intense pain. In a man, æt. sixty-seven, whose mastoid process had afterwards to be opened, I made in an extremely inflamed ear, after cataphoresis lasting ten minutes, an incision into the intensely swollen posterior wall of the osseous meatus, so as to slide the point of the knife to a great extent upon the bone. As he did not complain of any pain, I asked him whether the incision was painful, to which he replied : " Certainly, it hurts, but one can stand it ! " In a boy, thirteen years of age, whose external meatus was completely obstructed by several furuncles, and who on account of pain permitted only the most delicate manipulation, anæsthesia took place from cocaine cataphoresis (10% cocaine, 4 Glauert, 20 minutes) so as to allow quite a strong pressure of the probe in the external meatus. The simultaneous decrease of the swelling facilitated the easy introduction of a narrow speculum, which makes this method the more valuable for some examinations.

In the use of electrical cataphoresis some patients are subject in unilateral application of the electrode to galvanic vertigo, even when the current is carefully and slowly applied. It can be avoided by dividing the positive electrode and simultaneous electrization of both sides.

I am sure that in all cases in which cocaine cataphoresis was used, the sensibility was at least extremely diminished, and in many cases entirely abolished.

I have lately tried hypnosis for the purpose of anæsthesia, which has now gradually met with well-deserved approval among German scientists. I shall briefly mention some characteristic examples as they are met in practice.

A servant girl, æt. eighteen, is, except for an affection of the nose, otherwise healthy. The tip of the nose is reddened and thickened, the epidermis is rough and thrown off in large scales. The nasal mucous membrane presents, when examined at different

times, various swellings. Sol. arsen. Fowleri, five drops three times a day. Hydrarg. bichlor. corrosiv. (1:3000) for external use. After thirteen days the epidermis ceased to scale and had become smooth. Redness and swelling were lessened, but had not disappeared, and seemed to emanate from a whitish swelling the size of the head of a pin upon the centre of the nasal dorsum, having the appearance of a small, transparent atheroma. When punctured with the scalpel blood escaped. Six weeks later the swelling was excised in hypnosis after cocaine cataphoresis. After cataphoresis had acted for ten minutes, hypnosis was brought about by fixing the eyes upon a small, unpolished metal button, and by suggestion. The procedure appeared at first to be ridiculous to the patient, who was inattentive. But finally she fell fast asleep in less than five minutes, so as to be unable in spite of repeated loud requests to open her eyes. The head of the sitting patient was then fixed by suggestion in the position most convenient for operation, which was retained like a wooden figure until the operation was finished. Washing of the nose with sublimate. Oval excision of a piece of the skin, which contained the white portion, and adjusting of subcutaneous fatty tissue with pointed scissors. No cyst or similar structures were found. During the operation comparatively profuse capillary bleeding. The patient did not move during the whole time. Insertion of three sutures. At the first the eyes were opened and the fingers slightly moved. The eyes therefore were closed with the following suggestion: "Being asleep and insensible, how can you open your eyes?" After the sutures had been applied while she was quietly sleeping, she was requested to awaken. She looked around with the peculiar dull glance of a person aroused from natural sleep. When asked whether she had felt any thing or knew what had been done with her, at first no reply was made. But when further questioned whether she knew that I had incised and sewn her nose, she asserted that she had felt every thing. Three days later I asserted that she did not sleep, but had been quietly sitting, because she thought she was compelled. After the small wound had healed, *per primam*, under iodoform collodium, the sutures were removed under hypnosis. In spite of the request to resist falling asleep, hypnosis took place after less than four minutes, so as to keep the eyes closed in spite of repeated loud requests. Immediately after the removal of the third suture, the lids rose spontaneously. When asked whether

she had slept this time, she replied, "No." "Why did you not open your eyes?" "I could not do it." The face, moreover, was, during the different procedures, not moved in the least. This would have been surely the case in unpleasant or even painful sensations. The nose has now been pale for several months, but does not swell any more.

This is, in a measure, a school case, which demonstrates that even moderate hypnosis greatly facilitates an operation for the patient as well as for the surgeon. I hypnotized in this case because of the patient's fear, and also of the long duration of the operation. An entirely different cause for hypnosis was offered by the following case:

A female patient, æt. twenty-five, was troubled for a long time by mucous discharge, and principally by a persistent sensation of tickling in the throat. The faucial tonsils were found to be considerably enlarged, not toward the middle line, but as flat hypertrophies; besides large granulations upon the posterior pharyngeal wall. Galvano-caustic treatment was agreed upon. The patient placed herself in the proper position, but just in the moment when I intended to introduce the instruments into the mouth, they were pushed away with a jerk. Although the patient felt very much ashamed on account of her lack of self-control, further trials were of no avail. In order to attain my end, I proposed hypnosis. As the patient had been formerly present at one of Hansen's performances, I omitted further suggestions, and simply asked her to fix her eyes upon an unpolished metal button, while I was busy at my writing-desk. After less than five minutes she slept soundly, did not answer when called, and did not open her eyes when requested. At the command to open the mouth, I used slight pressure downward, stroked over the region of the maxillary joints, and suggested that the mouth could not be closed. I then introduced a wide tongue spatula, and cauterized. At each sizzling of the cautery the head was slightly moved backward, and the hands rose. But when I assured her, "Since you are sleeping and not feeling any thing, you should sit still," the hypnosis remained undisturbed. The hand was at times slightly pressed against the forehead and eyes in order to attain a better effect. I could thus remove the swelling in several sittings, and greatly diminish the symptoms. The patient did not always readily decide on hypnosis, because this state of weakness was

apparently an unpleasant sensation. She could, moreover, afterwards state most of what had occurred and was said during the hypnosis.

In the other two cases we had to deal with hysterical persons. A piano-teacher, æt. twenty-six, suffered from marked hysteria, which was influenced by domestic affairs and strenuous activity. Apart from other symptoms, she was greatly troubled by nasal obstruction, to which the headaches were attributed. The mucous membrane of the turbinated bodies, especially that of the middle, was extremely hypertrophied, so as to fill almost entirely the nasal meatuses. The left middle turbinated body was soft and flabby, resembling a polypus. Brushing with cocaine produced attacks of coughing from every place of the nasal mucous membrane, principally in the region of the middle turbinated bodies. After the establishment of anæsthesia, the soft swelling of the mucous membrane of the left middle turbinated body was removed with the galvano-caustic snare. At the same moment the patient sank into the chair apparently unconscious, and without convulsions. After $\frac{1}{4}$ of a minute the eyelids rose tiredly, and the entire attack was over in a short time (hardly a minute in all). The patient asserted not to have noticed the beginning of the attack, and to have lost consciousness for a short time. The conjunctiva was sensitive ; no examination, moreover, could be made during the short time of the attack. Immediately after the attack the patient felt entirely well and the headaches were rather diminished. A week later the right lower turbinated body was treated with the galvano-cautery. Another attack set in like that described above. The pulse remained quiet and regular during the seizure ; the respiration was short and jerking, but neither accelerated nor retarded. At the patient's urgent request, and also because I deemed it advisable on account of the considerable hypertrophy, I tried twice to reduce the mucous membrane by the galvano-cautery under simple cocaine anæsthesia. But, simultaneously with the first sizzling, loss of consciousness and marked hysterical convulsion occurred, lasting $\frac{1}{4}$ of an hour. After these attacks the headaches were intensified for several days, and the usual work could not be attended to. Under these circumstances it was, of course, impossible to perform an operation with sufficient prospect of success. Although the patient repeatedly presented herself at my office, I advised her against further experiments of this kind. I had formerly tried to hypnotize some patients, but had suc-

ceeded with this patient alone in producing a condition resembling hypnosis. Formerly I made them only fix their eyes upon an object, and I was not satisfied with my results. But since I lay the main stress upon suggestion the results are far more satisfactory.

After an absence of more than a year the above-mentioned patient returned to my office with the former complaint and the desire to free her nose for respiration. After brushing the nasal mucous membrane with a solution of cocaine, I made her fix her eyes, and suggested. The effect was readily brought about, not, however, as a sleeplike condition, but, after the patient has been sitting quietly, like the stage of excitation in beginning narcosis; she threw the head, arms, and upper part of the body about, and exclaimed, "I want to go home," "I do not need to stand everything," etc., all in the tone of an ugly child, but at the same time looking around drowsily. I gently pressed the eyes together, and talked energetically to her: "You have no will, nor can you exert your will, because you are asleep." She became quiet immediately, but some convulsions appeared in the arms. I deprecated even that, saying that this does not occur in this sleep. The head fell as in sound sleep toward one side, and I did not succeed in steadying it by suggestion, so it had to be held. Either lower turbinated body was energetically cauterized, whereby, at the most, the respiration was shortly retarded or more energetically performed, while no other movement was noticeable. The patient was then asked to awaken. She was breathed upon and the face sprinkled with cold water, but without success. But I succeeded immediately by the slightest pressure upon the hysterical pressure-point in the centre of the vertex. The patient opened her eyes, and simultaneously seizing her head with both hands, exclaimed: "A heavy load seemed to press upon my head!" She had not the slightest idea of what had happened with her during the hypnosis.

The second hysterical case was a widow, æt. forty-four, sent to me by Dr. DuBois Reymond, because it was supposed that the lachrymation, lasting for months, was caused from the nose. There existed, principally on the side corresponding to the affected (left) eye, large soft hypertrophies of the lower and middle turbinated bodies. At the first sitting I removed, under cocaine anæsthesia, the anterior end of the lower turbinated body with the galvano-caustic snare. At the moment when I pulled out a piece of the hypertrophic tissue of the size of a small cherry,

the patient fainted, fell to one side and was seized with convulsions, although, as she afterwards stated, she had not experienced the slightest pain. By slapping the face vigorously with a cloth dipped in cold water, she soon recovered her senses, and was able to go home. There she was seized on the same day with two attacks of convulsions, from which she formerly never suffered, although she was subject to fainting spells. At the next sitting I began the hypnosis immediately after cocainization, which soon took place, at the beginning with slight movements of the throat and arms, which soon gave way, upon suggestion, to quiet, sound sleep. There existed complete anæsthesia, so as to be able to pierce the skin of the hands and face with a needle without the slightest reaction. After cauterization of the hypertrophic mucous membrane, it was especially suggested that no convulsions would follow. In consequence of a simple command, the patient awoke and was able to walk home. The convulsions did not recur. At the third sitting the convulsions began to appear during cocainization, but they were cut short by immediate hypnosis. At the fourth and last meeting, therefore, her eyes were pressed together as soon as she was seated in the chair, and she was commanded: "You must sleep!" In a few seconds profound hypnosis took place. The nasal mucous membrane was apparently completely anæsthetized when I commenced the application of cocaine. I will add that also in this patient the head could be easily steadied by suggestion.

You will concur with me, gentlemen, that such experience is quite encouraging for further experiments. But the hypnosis, I regret to say, has also its drawbacks, among which I emphasize especially, that we do not, or frequently with difficulty only, succeed in establishing hypnosis in every case. On the other hand, hypnotized persons may retain so much psychical self-control as to resist an operative procedure.

After having reported several cases I add some general remarks on hypnosis. I do not, of course, intend to enter in detail into the nature of hypnotism. I rather recommend to those who seek information on the subject, Bernheim's book: "De la suggestion et des ses applications à la thérapeutique." Second edition. Paris, 1888. (Translated into English by Dr. Herter, published by Putnam's Sons,

New York), which has been frequently recommended by others.

I produced the hypnosis according to Liébault-Bernheim, by drawing the attention to the idea of sleep and I tried to prevent a diversion of the mind by having the eyes fixed upon an object. While I thus laid the main stress upon the suggestion, it impressed me to have a better effect if the person to be hypnotized was not directly addressed, but a third and entirely unconcerned person. I have never tried to keep up hypnosis for more than ten minutes, and I believe that I succeed in hypnotizing more than half of the people just as they come under treatment. The percentage will surely be increased with further practice. According to Liébault less than three per cent. of people remain uninfluenced by suggestion. We can regulate to a certain degree the character and course of hypnosis by a suggestion, which mostly consists of simple, but impressive words, at times of energetic command. The patient's fear of an operation did not, as a rule, appear to me as being an obstacle to the production of hypnosis, as is asserted by Masoin,[1] and also by Bernheim; for I have hypnotized several extremely timid persons. On the other hand, there are surely patients whose mind is so much enwrapped by fear as to render the hypnotizing influence without effect. Since we never know beforehand how deep the hypnosis will become, and principally whether we will succeed in producing thereby anæsthesia, I have *always simultaneously used local anæsthesia in operations, leaving to the hypnosis only the removal of the undesirable action of the psyche.*

On inquiries it was invariably stated that operations are not so unpleasant in hypnosis as with clear consciousness. In complete anæsthesia with subsequent amnesia this is a matter of course. Still better results in this direction will be obtained by occupying the mind of the hypnotized person during the operation in a quiet but pleasant way. Whether a physician ought to hypnotize patients only in the

[1] Rapport de la commission à laquelle a été renvoyée la proposition de M. Rommelaere, rélative à l'hypnotisme. M. Masoin, rapporteur.—*Bulletin de l'acad. royale de méd. de Belgique*, 1888, p. 111.

presence of others or not, this coincides according to my opinion with the question, whether he is at all permitted to receive patients alone. I consider an argument on this matter as superfluous. I have never seen, as well as Liébault-Bernheim, Forel,[1] Sperling,[2] Welbœuf,[3] injurious effects from hypnosis, and I believe that their appearance is not the fault of hypnotism, but that of the hypnotizer. Just because very much depends on experience and practice, and because in those cases in which injurious effects easily remain behind considerable medical knowledge is required, I deem it necessary that the medical profession only practise hypnotism. I emphasize the importance of the fact that all hypnotized persons should before awakening be addressed by a suggestion pointing to complete good health. How careful we have to be in our expression is demonstrated by the following example:

I suggested to an hysterical person before awakening from hypnosis: "When you now awaken you will not be seized with convulsions, etc. Wake up!" Hardly a minute after being awake a convulsive attack set in in the waiting-room. When called, I brought in a very short time the patient into quiet, sound sleep by placing the hand upon the eyes and forehead with corresponding suggestion. The suggestion was as follows: "You have not formerly paid sufficient attention to your condition, now, behold! You will never have convulsions, neither to-day, nor later, etc. Open your eyes now! Wake up!" whereupon the patient regained consciousness and quietly walked home.

For the objects which I have in view I concur entirely with Forel, as you may infer from my remarks: "The application of the entirely safe suggestion (I do not mention the dangers incident to its unskilful, criminal, or improper use) will, no doubt, gradually occupy the position it deserves in therapeutics; its indications should be rendered more precise, and freed from exaggerations, and the correct

[1] Aug. Forel. Some Remarks on the Present State of Hypnotism with personal experiences.—*Münchener med. Wochenschr.*, 1888, p. 72.
[2] Sperling. Some Therapeutical Experiments with Hypnosis.—*Neurol. Centralbl.*, 1888, p. 418.
[3] Discussion in Rapport, etc., by Masoin.

manipulation should be learned." I therefore advocate experiments with hypnosis in proper cases, being convinced that also in our specialty it will secure for itself a permanent place in the diagnostic and therapeutic management of hysterical deafness, subjective noises, hyperæsthesia, and like conditions, as well as in small operations.

RUPTURES OF THE MEMBRANA TYMPANI, WITH ESPECIAL REFERENCE TO THEIR FORENSIC IMPORTANCE.

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Translated by J. A. Spalding, M.D., Portland, Me.

I HAVE often had opportunities of observing ruptures of the membrana tympani at Professor Gottstein's clinique, and as several accidents of this nature were afterwards the subject of judicial inquiry, I undertook to investigate the matter somewhat more closely than had hitherto been done.

Among eight hundred and thirty-one aural patients who visited the clinique in about thirteen months, eighteen were cases of rupture of the membrana tympani. I was only able to utilize a few of these for scientific investigation, because most of them that were not likely to be judicially questioned did not return for any further examinations, whilst some came only once. I was repeatedly obliged to follow up several patients by visiting them at their homes in order to see how the injury progressed some time after its original infliction, so that ultimately I found but four patients who were willing to be repeatedly examined. The results that I discovered were confirmed by Prof. Gottstein and Dr. Kayser. I will now describe the cases in brief, employing for the terms membrana tympani, light spot, and whispered voice, the abbreviations, respectively, *Mt*, *ls*, and *v*.

Case 1.—March, 1887; Carl H., aged nineteen; box on left ear the day before; deafness and roaring; a horizontally-oval

rupture in the anterior inferior quadrant; *ls* dull; *v*, R more than 1 *m*, L much less.

CASE 2.—April 30, 1887; Ludwig E., locksmith; two days before, a fall on the head; hemorrhage from ear; headache, vertigo, roaring and deafness in both ears.

R *Mt*, a long rupture in anterior and inferior quadrant, through which bloody fluid can be blown; *v*, R 20, L 30 *cm*.

CASE 3.—May, 1887; Hermann B., aged sixteen; has been rather deaf for about a year, but hears much worse since a box on the ears yesterday; tinnitus.

L *Mt* very concave; calcareous deposit in the posterior inferior quadrant; in the anterior and thinned portion, an oval opening; *v*, R 0.6, L about 1 *m*.

CASE 4.—June 4, 1887; Wilhelm V., aged sixteen; boxed on the ears yesterday; rushing and deafness; is asserted to have heard well before.

R *Mt*, anteriorly and posteriorly, a calcareous deposit, with a rupture between, at six,[1] and its edges with blood coagula; *v*, both sides, about 30 *cm*.

Two days later the coagula had disappeared; in a fortnight the perforation was closed; *v* was 60 *cm*, and the *Mt* concave, and *ls* dull.

By October, L *Mt* still concave, cicatrix invisible; *ls* dull; *v*, R 60, L 30 *cm*.

CASE 5.—July 10, 1887; Amalie R.; *Mt* ruptured with a hair-pin; rupture between ten and eleven.

CASE 6.—June 22, 1887; Heinrich B., waiter, aged seventeen; box on the ear yesterday; deafness and tinnitus; oval perforation in lower half of *Mt*.

August 6th, discharged cured.

CASE 7.—July 27, 1887; Ernestine V., aged thirty-seven; box on the ears by her husband; deafness, roaring; used to hear well; R *Mt*, rupture close behind the handle of the hammer; blood coagula; *v*, R 40 *cm*, L 1 *m*.

February 26, 1888, snow-white cicatrix behind the handle; chalk spot in front and beneath; *ls* dull; *v* at some distance.

CASE 8.—July 29, 1887; August V., husband of the former, struck his head while driving, and perceived a prickling pain in

[1] This designation, after the hands of a clock, is very useful for orientation in the *Mt*, and is borrowed (so the author says) "from similar use on the cornea."

the right ear, roaring and deafness; on blowing his nose the air rushes through; always heard well; coagula on reddened *Mt;* no perforation visible; air whistles through with Politzeration; *v*, both ears, about 1 *m.*

February 28, 1888, both *Mtt* normal; *v* normal.

CASE 9.—August 11, 1887, Ida K., servant; box on left ear yesterday; roaring and deafness; small perforation in left posterior inferior quadrant; blood coagula; *v*, L 0.6, R 1.2 *m.*

CASE 10.—August 29, 1887, Pauline N., washerwoman, aged thirty-six; box on left ear yesterday; deafness and ringing.

L *Mt*, fissure in anterior inferior quadrant; *v*, both ears, 1 *m.*

September 30th, perforation smaller, coagulum on handle of hammer; *v* 1 *m.* A fortnight later, *v* 1.5 *m.*

April 20, 1888, both *Mtt* normal; *v* at a great distance.

CASE 11.—September 6, 1887; Carl G.; box on ear four days before; deafness and roaring; L *Mt* reddened; rupture with blood coagula; *v* 1 *m* in both ears.

October 24th, rupture healed; *v*, 1 *m*, both. May, 1888, *v* equal in both ears, and L *Mt* apparently normal.

CASE 12.—October 10, 1887, Anna K., aged thirty-eight; box on left ear September 15th, with subsequent violent pain; deafness and roaring; L *Mt* a round perforation with sharp margins at six, coagula on the posterior margin; external meatus tender; R *ls* foreshortened; *v*, L less than 1 *m*, R somewhat more.

CASE 13.—November 1, 1887; Clara S., aged sixteen; box on ear three days before; deafness, roaring, and a feeling of fulness; rupture with smooth edges in the lower half; *v*, distance not noted.

CASE 14.—November 8, 1887; Elfride W., aged four; hairpin pushed into meatus; pain; *Mt* reddened; small perforation; coagula. Subsequent suppuration from ear.

CASE 15.—November 21, 1887; Anton R., carpenter, aged forty-six; has been treated for deafness before; eleven days before, a board fell against right ear; roaring in both ears. R *Mt*, a long rupture in anterior superior quadrant; sharp margins and slight coagula. L *Mt*, a large defect in anterior half, with slight secretion; *v*, both sides, 1 *m.*

CASE 16.—February 8, 1888; Hermann B., aged seventeen, shoemaker's apprentice; boxed on the ears yesterday; tinnitus and deafness; on blowing nose the air rushes through.

R *Mt*, beneath short process of hammer, a small coagulum, and

then a radiating rupture along the handle. *Mt* concave; *v*, L 1 *m*, R "much farther."

February 27th, rupture still patent, but two days later had cicatrized.

CASE 17.—February 13, 1888; Anton K., lockmaker's apprentice, aged sixteen; boxed on the ears two days before; deafness and tinnitus; perforation whistle on blowing nose.

L *Mt* concave, somewhat opaque; *ls* hazy, posterior fold very prominent, and in its upper third a semilunar rupture with sharp edges and a small coagulum; *v*, L about 1 *m*, R much farther. The rupture cicatrized in a few days; *v* equal in both ears.

CASE 18.—April 14, 1888; Ada C., aged twenty-four; was boxed on the right ear; since then tinnitus left ear; "both ears used to run when she was a child."

R *Mt* is dull; small sharp-edged perforation in the anterior inferior quadrant; *v*, R rather more and L rather less than 1 *m*.

April 20th, perforation smaller, *v* equal in both ears. Tuning-fork heard better left.

April 28th, perforation still open; roaring for three days, "and the disagreeable feeling in right ear still continues."

Among these eighteen cases there were but two of perforation of the *Mt* by direct injury, and both of these were insufficiently observed. There is no question that the *Mt* can be perforated by the application of some slight force to an instrument; in these cases a hair-pin. But there is still considerable difference of opinion among the authorities on the spot of predilection of traumatic ruptures of the *Mt*. Zaufal and Urbantschitsch perfer the anterior, v. Troeltsch, Schwartze, and others the posterior half of the *Mt*. Zaufal's views are chiefly based on experiments on the cadaver, Urbantschitsch's on observations on the living, in whom he often had an opportunity of seeing an erosion, which indicated the path by which the injurious agent had travelled as far as the point of perforation. The differing views of different authors, the correctness of which no one has any reason to doubt, may be probably explained on the one hand by the varying inclination of the *Mt* and the curvature of the external meatus, and on the other by the varying capacity of resistance that the *Mt* offers, the sharpness of the

instrument, and the amount of force employed. In the two cases that I saw, the one (4) was perforated behind and above, the other (14) below. I find a suppuration noted in the latter, but without further details. In describing the indirect perforations I will return to this question, as well as to others arising in the direct ruptures.

The indirect ruptures are more interesting in their origin than in their forensic significance, and compose a noticeable percentage of all the aural patients.

The indirect ruptures are more interesting in their mode of origin than in their legal importance, and they form, as the above-cited cases prove, not inconsiderable a percentage of aural diseases. Amongst 831 ear patients at Gottstein's clinique, there were 16 indirect ruptures of the *Mt*, or in other words about 2 %. According to Chimani, whom Politzer quotes, there were 54 cases of this sort amongst 5,041 ear patients, a percentage of about 1. A similar percentage is mentioned by most of the authorities. Variations in the atmospheric pressure are the most frequent cause of the indirect ruptures of the *Mt*. Rarer are those cases in which a fracture of the skull, chiefly from above downward, is directly continued upon the *Mt*, as was extremely probable in Case 2, or where the skull remains intact, and the *Mt* is only torn asunder by contrecoup, as happened in Case 15. The variations in the atmospheric pressure were wholly due to boxing on the ear, except in Case 8, where the accident was caused by diving. Boxing on the ears—this unjustifiable corporal punishment, despite the repetition of public censure which it has of late years received from every competent aurist—is still too often inflicted by persons upon their inferiors, especially by teachers upon their scholars, and by masters upon their apprentices. It is the latter series which often become the subject of forensic consideration, and the heaviness of the penalty depends chiefly upon the judgment of the physician, which, I am sorry to say, is not often too sagacious. In the legal consideration of these cases, there are two especial points to be carefully considered; first, whether, in the absence of simulation, the hearing has been injured

permanently for life or *for a long period of time;* and secondly, whether the ear so injured by a blow had been previously healthy. These practical questions, together with others more theoretical and scientific, shall be satisfactorily discussed in the following pages, and not only in their ætiology, but in their symptomatology, to which I will add a few short remarks in regard to the treatment.

Ætiology.—So long as the causes of the indirect ruptures have already been mentioned, we have only to consider how the rupture takes place, and whether a normal *Mt* can in this way suffer an interruption in its continuity. All authors are united in asserting that ruptures of healthy *Mtt* by variations in the atmospheric pressure are very rare. But while some explain it as an especial exception, others, like v. Troeltsch, simply remark that a normal *Mt* is less easily ruptured than one that is pathologically affected. Other authors, on the contrary, assert that they have never seen a healthy *Mt* ruptured except as a result of very violent variations in the atmospheric pressure, such as explosions and cannonading from heavy guns, and in this opinion we are expected to read the suggestion that as a result of a box on the ear, the most frequent cause of all ruptures of the *Mt*, a healthy *Mt* does not rupture, and that this can occur only to one that is pathologically altered. Is there any reason now to doubt this opinion? I think that there really is. The stress of this question lies, first, in my opinion, upon whether we have so accurate a criterion for our opinion of the perfection of a given *Mt* that we are able under all circumstances to state whether it is or is not normal. Even if all the answers that the patient gives are presumably correct, the history of the case does not give us any firm foundation upon which we can judge the nature of the *Mt*, and quite as little of the rest of the ear. As v. Troeltsch truly says: "The objective examination, in many persons whom we know hear perfectly well, and who have no recollection of any previous disease of the ear, shows various pathological alterations in the *Mt*, which, without the least doubt, are referable to diseases that have already been passed through, or are still actually present."

Additionally, the history and even in most cases the amount of hearing give us no clue to the state of the *Mt*, its elasticity, and its tension. Nor does an actual inspection offer positive evidence on these important points. The light spot varies from a sharply defined triangle to complete haziness of outline, and the shape of the *Mt* is never precisely the same, even when the hearing is absolutely normal. Just as all the organs differ more or less in various individuals, so the various *Mtt* differ in their thickness, in their elasticity, and in their position relative to the bones of the skull. And further still, we must remember that, on the whole, but very little is known in regard to the elasticity of the *Mt*, a property that is of the greatest importance in considering the origin of any rupture of the same. "Aurists generally," says v. Troeltsch, "have hitherto taken it for granted that the *Mt* is elastic, because it can endure a considerable amount of pressure before it bursts. But according to Helmholtz, the *Mt* is not elastic at all, but must be looked upon as a membrane that cannot be distended." What a difference of opinions! If the latter is correct, we ought not to be surprised that a normal *Mt* can be ruptured with proportionally slight force. If now it is difficult or even impossible, under certain circumstances, in the absence of disease, to decide upon the active resistance of a given *Mt*, this is still more difficult to decide when the *Mtt* have suffered a loss in continuity. For they suffer, by this very means, an alteration in their tension, which gives them another form and another reflex than they had before the injury. In this way it may happen that a previously normal *Mt* awakes, after an injury, the suspicion that it had already been pathologically altered. Starting from this point of view, I did not consider that any one's judgment of any given *Mt* at the time of the injury could be satisfactory, but came to the conclusion that a long time after the cicatrization of the rupture it must be again subjected to a renewed and careful examination before we could give a final opinion in regard to its nature. For this reason I followed up the patients about six months or so after the injury. Of the four cases that I carefully examined under

such circumstances, Case 10 exhibited a *Mt* that corresponded to all the demands that any one could ask of a normal one. This was the case also in Cases 8 and 11. If these *Mtt* had not been normal at the time of the injury, they were as surely not normal at this examination. These facts demand at least that in our judgment of the nature of an injured *Mt*, we ought to be extremely careful, and to wait before making our final verdict in doubtful cases; a delay which appears demanded from other reasons into which I will enter later. They at least justify the assertion that the question whether a normal *Mt* can be ruptured by a box on the ear or by a similar trivial injury is not yet settled, although at the same time it must be granted that in a large majority of cases it is the pathologically altered *Mt* that ruptures upon the application of this injury. What the nature of these alterations is, no one can at present precisely state; it is easy to see that only some of them dispose to ruptures. Nor ought we to forget that if it is very difficult under some circumstances for even a skilful aurist to decide this question, most legal physicians could scarcely be in a position in doubtful cases to offer a competent opinion whether any membrana tympani were normal or not. At all events, such great weight ought not to be laid upon this point as happens at the present time in court. For a *Mt*, even if extensively implicated by pathological alterations, is nevertheless capable of acting normally, as Gruber expressly asserts, and he concludes from this "that a new injury to such a drumhead is of the same importance as that to one with normal functions." For this reason I ascribe to the whole question more of a theoretical value. Attempts have even been made to solve the question experimentally. Schmidekam found in one experiment that a healthy *Mt*, preserved for some weeks in alcohol and deprived of its anvil and stirrup, required for rupture a mercury column of 143 *cm.* The rupture ran directly parallel to the lower three fourths of the handle of the hammer. Another drumhead that bore traces of a former inflammation, demanded a mercurial column of 168 *cm* before it would break. These experiments (and here I

agree with Schwartze) prove very little, if any thing. On the one hand, alcoholic preparations are of slight value in comparing the condition of the living with the dead; and on the other, the *Mt* rapidly changes its structure after death, in comparison with that which it had during life. As Helmholtz has shown ("Mechanics of the Ossicles and Membrana Tympani"), the *Mt*, when the death-rigidity of the tensor is past, is nothing but a slack membrane, owing to the relaxation of all its ligaments and tendons. Now such a membrane as that ruptures, as experiment teaches us, with much greater difficulty than one that is tense, because a certain quantum of force must be applied in order first to stretch it tight. In Schmidekam's experiment, both hammer and anvil were removed, something that very considerably interferes with the tension and the capacity for resistance. Furthermore, the two experiments just cited contradict one another decisively, since observations on the living prove that, at the least, a pathologically altered *Mt* ruptures much more easily than one which is normal, while in his experiment a greater force was needed to rupture the diseased *Mt* than the normal, for which, in my opinion, the presence of pseudo-membranes gives no foundation. Gruber, too, has attempted to decide this question by experiments on the cadaver, but, as Schwartze has already emphasized, they offer no standard for comparison, because no data in regard to the weights applied or the pressure employed are given. And more than that, the larger part of the experiments were made from within, *i. e.*, through the tube, while it cannot possibly be a matter of indifference whether the membrana tympani is affected from within or without, especially since so far as the tension of the muscles, tendons, and joints is concerned, the increased pressure must act differently from within, than when applied directly through the meatus.

Among other points that predispose to rupture of the *Mt*, in addition to the nature of the membrane itself, are the closure of the tube to which v. Troeltsch was the first to call attention, and a certain width and expansiveness of the external meatus, which somewhat struck me in a few cases

of my own. Still, it is not always the impetus of the force employed, but the production of an hermetical closure of the air in the external meatus that is here to be taken into account.

The second of the above-discussed questions, how the rupture ensues, shall be more closely discussed in describing the symptoms.

The *symptoms* of a rupture of the *Mt* produced by variations in the atmospheric pressure are rather numerous, but not of equal value in forming an opinion in the case. We must accurately separate the subjective from the objective. Amongst the objective, the most important is the presence of blood coagula upon the membrane and a visible rupture; an additional symptom in many doubtful cases is the perforation whistle.

A blood clot upon the *Mt* distinctly evidences that an injury has been inflicted. On the contrary it is not necessary that a rupture in the membrane should be simultaneously visible, as a case that was seen at the clinic, but not here quoted, proves. When we find both a coagulum upon the membrane and a rupture, there cannot be the least doubt in regard to the nature of the perforation. The coagula were only absent in four of my cases out of sixteen. Amongst these were two where the coagula were still adherent to the rupture after so long a time as two or three weeks. In some of the cases the remnants of the clot wandered to the periphery of the *Mt*, an occurrence which Schwartze ascribes to the pecular exfoliation of the epidermic layer of the *Mt*. I have never seen a box on the ears followed by an unusually extensive hemorrhage. It was only in Case 2 where the rupture had been caused by a fall on the head, that the patient volunteered the remark that the blood had flown out of his ear, and blood was still present in the external meatus, and could be blown through the rupture by Valsalva's experiment. All things combined in this case go to prove that there had been a simultaneous rupture of the bones at the base of the skull.

The second symptom, *a visible rupture*, speaks for itself. Still, on the one hand there are cases in which the rupture

is invisible, and yet we are able to make the diagnosis; and on the other hand, the question arises whether its form and locality offer any support in regard to its traumatic nature. Just as in Case 8, we are justified in asserting a rupture without seeing it, whenever a whistle is perceived on resorting to Valsalva's or Politzer's experiment, in which case we are also to consider the patient's assertion that he feels a rushing through his ear whenever he blows his nose. The invisibility of the fissure may depend simply upon the fact that it has a linear form, as I subsequently proved to my satisfaction in Case 8. A fissure of this sort will be difficult to see when it happens to lie in the neighborhood of a bright reflex. Politzer thinks that such a fissure is extremely rare, and Chimani, whom he quotes, did not find a single one in his numerous cases. Nevertheless, from the reasons that I have advanced, I think that we must assume in Case 8 (invisible cicatrix despite the fact that the entire *Mt* was open to inspection) a linear rupture, and that I must offer it as an example of the rarer type of this sort. The most frequent form, however, and the truly typical one of a traumatic rupture, is that which is longitudinally oval, and one that corresponds precisely to our ideas of the structure of the *Mt.* When the atmospheric pressure has stretched the membrane to its utmost, the circular fibres, which extend all over the membrane, though according to Gruber decreasing at the umbo in thickness, regularly rupture. As they retract the radiating fibres start asunder, and thus produce a gaping fissure, *i.e.*, an oval rupture. If the margins cling to one another, the fissure is a linear one. v. Troeltsch regards the split-like form of a fissure as so characteristic of its traumatic origin, that he asserts that the oblong fissure which we often see in otitis media acuta (if we can catch it in its early stages), owes it origin to variations in the atmospheric pressure, and not to suppurative liquefaction. This is based in his opinion upon the fact that the air begins to whistle through the *Mt* in otitis media acuta when the patient blows his nose very forcibly or sneezes violently. The round form, however, is not by any means rare, and demands additional interest on account of its resemblance

to the perforations after purulent otitis media. The latter are distinguished from the traumatic by the fact that they have wall-like margins and generally exhibit some purulent secretion. But there are such perforations which are nothing but a round hole with sharp edges and without secretion. In and by themselves they are not to be distinguished from those of a traumatic nature, only their behavior offers the diagnosis, in that the traumatic heal in a short time, whilst the others remain patent for a long time, even if not for life. Nevertheless it deserves to be mentioned that the closure of a round fissure, since the *Mt* is in these cases generally atrophic, may take a great deal longer time than those that are oval, and yet much less time than those due to suppuration, even if the latter ever heal at all. A second diagnostic point to reveal the nature of such a fissure has been mentioned by various authors *in the auscultation sound.* Politzer emphasizes the fact, that in the traumatic rupture, *the sound is low and blowing*, whilst in the pathological it is *sharp and hissing.* I will not venture to criticise this remark, since I have no experience to offer; at all events the symptom is one that would be more valuable and available for the aurist than the judicial physician. It was impossible at the first examination of Case 18 to decide the nature of the rupture, and it was not until it gradually decreased in size that we could diagnosticate its traumatic origin, since there were no coagula present. Dr. Kayser did not lay much stress upon the auscultation sound in this case. In order to bring this subject to a close, I will only remark, that Urbantschitsch regards it of so great importance, that with its assistance he could *diagnosticate a rupture without any inspection of the Mt.* I should think on the whole, however, that, as suggested above, it could, at the most, only be employed as an assistance in doubtful cases.

The situation of the fissure is of no value for the diagnosis in doubtful cases, and yet it is of a certain regularity, and therefore of some scientific interest. The authorities differ greatly in regard to its point of election. Politzer asserts that it is much oftener seen in the posterior portion of the *Mt* than elsewhere; Hassenstein thinks that a rupture in

front of the handle of the hammer is the greatest of rarities; Urbantschitsch and Hartmann found the fissure oftenest in the inferior half; Schwartze in the inferior anterior quadrant, and v. Troeltsch in a medium locality between all these; according to him the fissure either runs behind the manubrium and parallel to it to about where the long limb of the anvil runs down, or in the anterior inferior quadrant. On looking over my cases I find that of fifteen ruptures (one was invisible) *eleven were in the inferior half, i. e., eight in the anterior and three in the posterior; from which we see that the inferior and anterior portion is the elected region.* Bearing this in mind I asked myself whether the frequency of this location might not be explained by the structure of the *Mt*, and in so doing I studied three points: the thickness, the tension, and the direction of the fibres in the different quadrants. There are differences which make it seem plausible that when the *Mt* is not too greatly degenerated, the inferior and anterior portion ought most often to suffer a solution of continuity. The membrana propria consists of an external radiating and an internal circular layer. But the fibres are only radiating in the inferior half, and in that portion close behind the manubrium; otherwise they run more irregularly, and are mingled with one another into a structureless mass. The region close behind the manubrium is strengthened by descending fibres, which lie farthest outward, and originate from the subcutaneous tissue. The entire superior and especially the posterior half of the *Mt* is strengthened and thickened by the so-called dendritic fibre-stratum discovered by Gruber, which is located farthest inward, *i. e.*, toward the tympanum. In the same way the tension in this district is also greater than elsewhere, and the tighter a membrane is stretched the easier it tears. The very fact, too, that the anterior inferior quadrant contains the light spot, goes to show that here the tension is at its maximum.

Subjective symptoms are equally constant with the objective in cases of rupture of the *Mt*. Urbantschitsch does not seem to be of this opinion, and Hassenstein affirms that in simple ruptures without great effusion of blood and

inflammatory swelling, the disturbance is often hardly noticeable. *Subjective symptoms, tinnitus, and deafness*, were present in every one of these cases, and yet I will make no reply to the possible objection, that it is only those patients who were troubled with these symptoms that ever visited the clinique. Granted that it is true, it is odd that other observers should never see any other patients than those with the same symptoms. Suffice it to say, that all of the patients, leaving aside the momentary snap or stinging pain perceived at the time of the injury and upon which I lay no stress, complained of tinnitus and deafness, with which in one case was associated a sensation of vertigo that lasted for some time.

The loss of hearing was about the same in every case. Generally a whisper was not heard farther than 1 *m* in the first day or two after the injury. The whisper test for the hearing I regard as the best, unless there is suspicion of simulation, when the watch will quicker detect the attempted fraud. Wolf considers the whisper as the most perfect audiometer, because it can characterize the most delicate shades, pitch, volume, and clang-tint. If, however, as Hartmann thinks, it is too complicated to be accurately employed as an audiometer, yet no test is complete without it, since on the one hand the hearing for speech is in most persons the one most exquisitely developed, and on the other any difficulty in perceiving it is of the most disagreeable and unfortunate consequences to the patient. In this way, then, we proved that the loss of hearing was about the same in every case, and therefore that the degree of deafness does not depend upon the extent of the fissure. I find no suggestions from the authorities upon this point, excepting a side remark by Schwartze, that the diminution of the hearing in trivial ruptures may be extremely slight. In my cases this was not so at all. I was struck with the fact that in seven patients the hearing was reduced in both ears, and to about the same amount in each. I do not recall a single case of rapid improvement in the hearing, even if but transitory, as noted by most authorities in certain cases in which abnormal tension and adhesions of the *Mt* had previously impaired its functions.

How long does the deafness last? The entire forensic interest of the case centres around the answer to this question. The deafness almost always yields to the former amount of hearing after a few weeks, but I must expressly emphasize the fact that in some cases the return of the hearing did not precisely coincide with the closure of the perforation. There are, however, many cases in which the deafness lasts for a considerable length of time, and it is these that lay difficulties in the path of the legal physician whilst making up his final opinion, and often obtain unjust damages. For the loss or a decided diminution of the hearing is reckoned as one of the grievous injuries, although the Prussian penal code excepts unilateral alterations. How then can the physician protect himself from unjustly deciding how much the hearing is damaged in any case? Let him wait a long time before giving his final opinion. How long he shall wait the following cases may decide: In Case 10 the hearing at the time of discharge was *v* 1.5 *m*, and in Case 11 *v* 1 *m*, although two months had elapsed in both since the injury. If tested at that time the judge would have decided that the hearing had been greatly injured, and as both ears were equally affected in Case 11, it is very probable that the assailant would have been severely punished. I followed up these cases, and in Case 10 six months after the discharge of the patient, and in Case 11 seven months, the hearing was absolutely perfect in both ears. The case described by Casper Liman, Cap. 56 of his *Gerichtliche Medicin*, is of great interest. The injury had been inflicted in February, the examination took place in May of the same year. The examiner found extreme deafness. He acknowledges that according to the opinion that he then formed, the assailant was to be recommended for a very severe punishment. Now very fortuitously the May term did not sit, and the next term was set for November, when it was found that the complainant could hear as well as ever, *i, e.*, normally. Hence we see how careful one must be in such cases to decide justly between both parties to a suit for alleged damages. Politzer is correct in urging a delay of at least three months in doubtful cases,

but I would go farther in the interest of the defendant. Therefore in Case 4, in which the injury was done on the 3d of June, and the last examination made in October for the purpose of testing the hearing in a trial for damages, when the hearing was actually found to be very defective, I should have waited some months longer before giving a definite opinion, especially as the hearing was poor in *both* ears. Unfortunately, I have never been able to find the patient since that day.

If next we have a case in which deafness is actually demonstrated after an interval of satisfactory length, then arises the question whether it was not present before the injury, or whether it has not possibly been increased by the same. Liman aptly says: "Nothing is easier than to assert that deafness has resulted from a box on the ears. Indeed it is easy to be deceived in such a case, if a previous deafness has fortunately been attributed to an injury lately committed against the ear formerly deaf. We shall, however, grievously deceive ourselves, if we take it for granted, without further investigation, that every such case is only one of simulation or exaggeration. Then we ask, if the objective examination offers any proof that a deafness may or may not have existed before the injury. And we have to say no. For, as we have already stated, the appearance of the *Mt* has nothing distinctive, since a *Mt* strangely altered in appearance may perform a normal function. It is impossible also to demonstrate objective alterations in the labyrinth of an injured ear, and even in chronic diseases of the middle ear we are not able to prove the previous existence of a considerable degree of deafness. In such cases we merely suspect, or we deem it probable, that with such a condition of the parts, deafness must have existed long before the injury; but we cannot positively assert that this was actually the case. Such an opinion is not unobjectionable, but it does not assist the judge, so that we are obliged to fall back upon the history of the patient and the testimony of outsiders, which is a poor source of evidence. Neither can the physician decide from the objective condition of the parts whether a previous deafness may or may not have

been increased by the injury, unless accidentally he had previously had an opportunity of examining the ear. Whilst on the one hand some authorities assert that an injury may transitorily improve an existing deafness, it is on the other hand true that most of the cases (as in Case 3) are often, though but transitorily, impaired. I would mention here the remark of a judge in a given case: he thought that he ought, contrary to the opinion of an expert, to decree a severe sentence against the assailant, because, to his mind, it was a greater injury to increase a previous deafness, than simply to produce an original deafness in the same way.

Conjoined to these important practical questions is the extremely interesting scientific one of the origin of the deafness in cases of a ruptured drum-membrane. This may depend upon alterations in the sound-conducting or the sound-perceiving apparatus, or in both. The very first thought is that the deafness is due to the fissure in the *Mt*, and this seems to be the opinion of most of the authorities, although they do not expressly say so. A deeper investigation into this topic seems to make it probable that the fissure contributes to the deafness, but that it does not suffice to explain the deafness in the typical cases, *i. e.*, those that are uncomplicated. The disturbed conduction due to rupture of the *Mt* can be deduced from the mechanism of the membrane, as developed by Helmholtz. The *Mt* is a tense membrane, varying from the tissues generally employed in acoustics in that it is curved. It is stretched taut and drawn in by the manubrium, which is held, in its turn, in this position by ligaments and the elasticity of the tensor tympani muscle. The convexity of the radiating fibres toward the meatus is exclusively due, according to Helmholtz, to the tension of the circular fibres. But it is the radiating fibres that transmit the vibrations of sound to the manubrium, and their slightly arched arrangement produces the same mechanical action as if the atmospheric pressure were acting upon the end of a very long lever, while the short process of the hammer, where the burden is the heaviest, formed the arm of a very short lever. If, now, the circular fibres are torn, the radiating fibres must flatten, and the advantage that resulted for the propagation of waves of

sound from their bow-shaped arrangement is now lost; the waves of sound that are small in amplitude can scarcely be transmitted. Attractive as this explanation may seem (and with a healthy *Mt* it might be the most suitable one in the world), yet experience teaches us that persons with flattened and even strongly concave *Mt* are capable of nearly normal hearing. Besides this, in cases of rupture, we generally have to do with membranes that, owing to pathological alterations, have already lost a portion at least of the convexity of their radiating fibres, and in them, therefore, the flattening cannot produce so marked an effect as, theoretically, we might attribute to them. But, more than all that, the size of the fissure ought to stand in some reasonable proportion to the degree of the flattening, and consequently to the intensity of the deafness, which, however, as I have already remarked, does not in reality occur. If we leave aside the flattening of the fibres, the attempt to explain the deafness, perhaps in another way by the fissure of the *Mt* exclusively, meets on the one hand with the fact that the cessation of the deafness does not coincide with the closure of the wound, and on the other that deafness may frequently follow a box on the ears without any subsequent fissure in the *Mt*.

If now the rupture in the *Mt* does not suffice to explain the deafness, we may imagine that a hemorrhage in the middle ear, or some loosening of the ossicular ligaments, had interfered with the conduction of sound to the labyrinth. A hemorrhage in the middle ear, above all such a one as would hinder all the vibrations of the *Mt*, is very rare, and, so far as my experience goes, has never yet been seen after a rupture due to a box on the ears. And yet Urbantschitsch and Schwartze think that these hemorrhages are a frequent cause of the deafness. An extensive hemorrhage is, of course, by itself capable of seriously reducing the hearing, and the same may be said of a possible dislocation of the ossicles, in regard to which all the text-books are silent, but which may not be so rare when we reflect that particularly the hammer-anvil ligament is so delicate that it is ruptured quite easily by pulling on the ossicles. Luxations of the ossicles have also been mentioned, but mostly after direct injuries. Yet, after all,

all of these injuries can only occasionally be drawn upon to explain the deafness in many cases of injury of the *Mt;* they are of no value for drawing reliable conclusions in the average run of cases.

For all these reasons I arrived by exclusion at the opinion, that the sound-perceiving portion of the ear can be simultaneously affected in most cases of rupture of the Mt, and then I sought for positive proof of this opinion. First, we know that the *Mt* may remain intact, yet deafness arise from shock of the labyrinth; secondly, hyperæsthesia of the auditory nerve has been repeatedly observed after injuries of the *Mt;* thirdly, many authors insist that the semicircular canals must have been injured with the *Mt,* because of the vertigo that often follows; furthermore, how else can we explain extreme deafness in the opposite and uninjured ear; and, finally, examinations on the cadaver have shown that, where a concussion had resulted in total deafness, there was no trace left in the *Mt.* Yet irreparable labyrinthine concussion is rare in simple rupture of the *Mt.*

Therefore a degree of labyrinthine concussion is a probable cause of a portion of the deafness in every box on the ear, though the more important rôle must be played by the hereditary disposition of the parts, or by previous pathological alterations.

If objection is made that the question of labyrinthine participation is superfluous, since we can easily decide that by the tuning-fork, I reply that this test is useless in traumatic ruptures of the *Mt,* because most of the sufferers have previously been affected with middle-ear disease, and that additional middle-ear changes are excited by the rupture itself, which interfere with the test. Hence, better perception of the fork in the injured ear by no means excludes a labyrinthine affection, to say nothing of the fact that the vast majority of people are so poorly educated in a musical point of view that the tuning-fork test cannot be relied upon at all.

It may also be noticed that the tinnitus, so often complained of after rupture of the *Mt,* is only an additional sign of labyrinthine disturbance.

Progress of the case. The rupture generally heals in from

three days to six weeks. The shortest time in my cases was twelve days, the longest forty-five. We do not yet know whether the fissure cicatrizes from the epidermic layer or the mucous. Most observers accept with Politzer the latter mode, while Zaufal thinks that the epidermic layer plays the curative rôle. Some interest attaches to the question whether the cicatrix is visible for a long time after the injury, because, if it remained long visible, it would serve in doubtful forensic cases for the basis of an opinion upon the origin of any disputed alteration in the hearing. In Case 7, the cicatrix was still visible seven months after the injury, but I think that this is an exceptional case. We can, on the whole, agree with Politzer that the *Mt* later regains its normal appearance so that no cicatrix is visible.

It is rare for an indirectly ruptured *Mt* to suppurate, provided that it is correctly treated, and that the injured person takes reasonably good care of himself. If directly ruptured, as in Case 14, suppuration is more common. According to Politzer, these direct ruptures rarely cicatrize without suppuration, and they leave permanent openings. Nevertheless, if the patients are disposed to it, suppuration can ensue without direct cause, even after the indirect rupture. Such suppuration is not to be distinguished from any other, but the proof of the traumatic nature is the proportionally rapid closure of the opening, although Schwartze has seen permanent perforations follow. Hassenstein reports a case in which suppuration followed a bath, yet the perforation was cicatrized within eight days.

Treatment. The chief rule is to do no harm. A trivial injury of the *Mt* unskilfully treated may become the starting-point of a chronic middle-ear suppuration, with all its disagreeable consequences. The best treatment is simply to close the meatus with a wad of absorbent cotton, and to avoid all use of the syringe. I know that there are plenty of physicians who still use the syringe in these cases, but I should not use it unless suppuration ensued, and even then with great caution. Furthermore, the forcing of air through the tubes by the physician or the patient ought to be most carefully avoided. And, on the whole, if there are no further complications, the patient can attend to his affairs as usual.

HYPERTROPHIES OF THE POSTERIOR EXTREMITY OF THE INFERIOR TURBINATED BODIES OF THE NOSE.[1]

By R. CHOLEWA, of Berlin.

(*With a wood-cut.*)

Translated by Charles H. May, M.D., New York.

THE increased attention which tumors of the nose and naso-pharynx have received from rhinologists and aurists, as well as from general practitioners, on account of the frequency of complications, such as deafness, asthma, and facial neuralgia, especially headaches, has given greater importance to the tumors, concerning which I have endeavored to say a few words. Through the kindness of my honored *chef*, I am enabled to report 93 cases; 35 of these were his own patients, seen during the last year and a quarter; the remaining 58 were recorded and observed by me in the clinic. The following synoptic tables will serve to prevent repetition:

Age.	Males.	Females.	Bilateral.	Right side.	Left side.
10 — 20.....25	17	8			
21 — 30.....39	26	13	40	38	15
31 — 40.....21	19	2			
40 — 61..... 8	6	2			
Total.....93	68	25			

[1] From Dr. A. Hartmann's clinic for diseases of the ear and nose, Berlin.

I.—AURAL COMPLICATIONS.

1.	Otitis med. acut. with and without otorrhœa	12 cases.
2.	Swelling of the tubes	13 "
3.	True sclerosis	8 "
4.	Residual conditions	6 "
	Total	39 "

II.—OTHER COMPLICATIONS.

1.	Adenoid vegetations	9 cases.
2.	Nasal polyps	4 "
3.	Empyema of the maxillary sinus	4 "
4.	Asthma	4 "
5.	Epilepsy	1 "
	Total	22 "

And (6) frontal headaches in two thirds of the cases.

Semeleder appears to have been the first independent observer of posterior hypertrophies, and also the first to call attention to their importance for the nose; at least he illustrates a series of these especially on plates I. and II. in his work "Die Rhinoscopie und ihr Werth," etc., Leipzig, 1862. They did not, however, receive any great notice until after attention had been called to the adenoid vegetations. The literature on the latter subject has already assumed large proportions, while there exists but very little on hyperplasia of the inferior turbinated bodies, which is entitled to special mention, excepting Hopmann's work (published 1883), which is thorough and rich in material. According to Dr. Killian's report of 156 cases of adenoid vegetations operated upon in Dr. Hartmann's clinic during the summer of 1886, the majority of such cases occur in the decade between 5 and 15 years. Their occurrence must, therefore, be looked for in the premature period, while the development of hypertrophies, especially of the posterior extremity of the inferior turbinated body, belongs more to the age of puberty and the following years up to the end of adult life. Furthermore, whilst adenoid vegetations and hypertrophied tonsils are found very frequently in children of a scrofulous diathesis, this tendency could scarcely be demonstrated in the cases afflicted with posterior hypertrophies, though occasionally both affections are found associated, especially at the limit of childhood, there does

not seem to be a direct connection between the two. In other words, we must not assume that posterior hypertrophies will take the place of adenoid vegetations at the approach of puberty, when the latter cease to grow or become smaller, especially relative to the increased development of the naso-pharynx. Most authors attribute the development of hypertrophies of the mucous membrane of the turbinated bodies to chronic catarrhal swelling.

I will not attempt to decide whether increased or diminished fulness of the venous system is a factor, though several authors seem to favor this view. Thus Hopmann (*Monatsschrift f. Ohrenheilk.*, 1885, Nos. 6 and 8; "Ueber Nasenpolypen") says: "We find these (hyperplasiæ) appearing with especial frequency as pure nervous or inflammatory or as nervo-inflammatory 'stasis-tumors,' occupying the anterior extremities of the middle turbinated bodies, and the anterior and especially the posterior ends of the inferior turbinated bodies."

That such stasis-tumors of a venous nature may really exist is indicated by the almost regular occurrence of nasal catarrh and hypertrophies in cases of deviation or of larger spurs of the septum. In such cases, if one side be obstructed (and this usually occurs in the anterior third of the nose), we can almost always expect a hypertrophy of the posterior extremity of the inferior and more rarely of the middle turbinated bodies. Though some of these deviations of the septum occur congenitally, and others are developed at puberty, there are still quite a number in which the original origin of this change may be traced to some form of traumatism—a fall, push, or blow upon the nose—during boyhood. Many of the cases state most definitely that since the time of such traumatism, often since their twelfth year, they have experienced the sensation of obstruction in the nose; all of such cases presented deviations accompanied by greater or lesser posterior hypertrophies. Another factor in the etiology of hypertrophies, I believe to be the occupation of the individual. Those occupations seem specially predisposing, in which work is done in the stooping posture, in a dust-laden atmosphere, often

near heating gas-jets, etc. I was impressed, especially, with the large number of cases of diseases of the nose occurring in printers. I will not venture to decide whether greater intelligence in this occupation induced them to seek medical aid early, or whether their particular work caused the existence of nasal obstructions to become more evident.

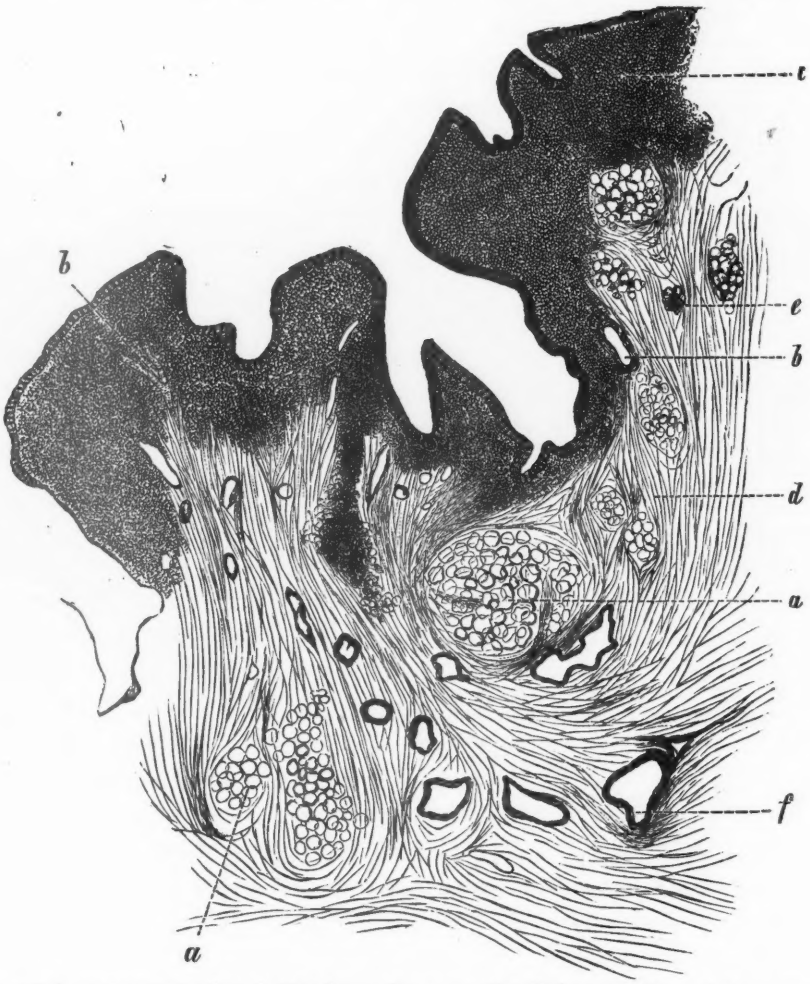
The preceding tables indicate that men are much more ($\frac{2}{3}$) subject to hypertrophies than women ($\frac{1}{3}$). Occupation may be a very important factor in the etiology, for it is the work of females which most often requires a stooping posture of the head and a strained use of vision. The difference in mode of living seems to be a more potent causative factor, the daily use of alcohol and tobacco as stimulants probably serving to explain many affections of the naso-pharyngeal tract in men. The age of puberty also seems to be quite predisposing, for it is seen that more than double the number (64) of cases of hypertrophies occurred between 10 and 30 years, as compared with subsequent periods (29). It is also noticeable that the right side of the nose was affected much more frequently than the left; in 53 cases, the affection was limited to the right side 38 times, while on the left side it occurred 18 times only; 40 cases presented bilateral involvement. This justifies the statement that the majority of cases of deviation of the septum cause narrowing of the left side of the nose, the corresponding dilatation on the right side allowing more space for the development of such tumors. Thus it will be seen that there are many factors which favor the development of hyperplasia of the mucous membrane covering the turbinated bones. Let us now consider the form which posterior hypertrophies most frequently assume.

According to Hopmann, whose work mentioned above presents a large amount of material observed anatomically and examined microscopically, they are nearly always pure hyperplasiæ of the mucous membrane of papillomatous appearance and structure. An examination of our material leads us to agree with him, there being only this difference in individual cases, that sometimes the papillæ are more developed, in other cases they are less developed. We

observe extremities of the turbinated bodies almost perfectly smooth, in which a papillomatous structure can scarcely be demonstrated microscopically except with the use of the magnifying-glass; but we also see hypertrophies which resemble a bunch of grapes. The former variety is the more frequent in cases in which the hypertrophy is limited to the posterior extremity; the latter variety is usually seen involving also the anterior extremity and the middle portion of the turbinated bodies. Professor Köster, who examined these "papillomata" at Michel's request, in 1876, describes them as "angiomatous" glandular polyps of the mucous membrane. On the other hand, Professor Virchow regards the hyperplasia of the connective tissue as the more important, and hence calls them "papillary fibromata." It is evident, therefore, that the material submitted to various pathologists must have differed in appearance and structure. Our own examinations lead us to confirm both views: While the larger-lobed, grapelike tumors present the formation of blood-vessels, beside a decided abundance of glands, in the smoother varieties, the increase of connective tissue is the more marked; and the latter varieties seem to be present in larger numbers only after the tumors and the entire mucous membrane of the inferior turbinated bodies have undergone retrograde changes.

I have taken the liberty of adding a drawing representing a microscopical section, which will serve to explain these observations better than any description could. The accompanying illustration of the longitudinal vertical section of a posterior hypertrophy demonstrates the enlarged, lobelike structure. Deep depressions, covered with epithelium, alternate with marked elevations. In both of these situations acini and excretory ducts of the glands are seen in large numbers, and between these are found dilated vessels which, nearer the periphery, divide into smaller branches. The entire periphery, even in the intervals between the ducts of the glands and the small branches of vessels, is occupied by an infiltration with small cells, which are most numerous around the small vessels of the periphery, as is shown by the staining of the nuclei.

Regarding the symptoms, I would state in advance that the smallest number of patients sought medical treatment on account of a direct complaint of unsatisfactory supply of air. The majority complained of an "obstructive coryza,"



a, acini, cut transversely ; *b*, blood-vessels ; *c*, small-celled vegetation ; *d*, stroma ; *e*, excretory duct, cut transversely ; *f*, dilated blood-vessels.

i.e., "they could inspire satisfactorily, but although having the greatest desire to blow the nose, there was nothing gotten rid of." This is quite simple. The swollen posterior extremities are pressed into the posterior nares with each forcible expiration, and the more violent the efforts to blow

the nose are, the more obstructed will the inferior nasal passage, which has already been narrowed, become. Many, very many (two thirds), placed themselves under treatment on account of constant frontal headaches ; many on account of a sensation making them cough, or a sensation of a foreign body being in the "throat," or on account of diseases of the ear, and the tumors were only found after regular examination of the interior of the nose, which is never omitted in Dr. Hartmann's clinic.

The deleterious effects of adenoid vegetations upon the organ of hearing in children are sufficiently well known ; but, as Dr. Barth (Berlin) recently demonstrated (*Berl. klin. Wochenschr.*, 1888, No. 2), hypertrophies of the mucous membrane covering the turbinated bones may also cause purulent inflammation of the middle ear. However, posterior hypertrophies affecting the organ of hearing are most apt to produce swelling of the tube, and next frequently sclerosis of the mucous membrane of the tympanum. Our collection of cases shows that 4.3 % of all patients who presented themselves for treatment of the ear were affected with hypertrophy of the posterior extremities of the inferior turbinated bodies. The headaches, about which a large portion (two thirds) of our patients complained, and which, especially in the case of women, frequently occur as attacks of migraine, may be regarded as reflex neuroses of the fifth pair of nerves. In this connection we must also think of asthma, although this affection does not occur so prominently as we would imagine, especially in posterior hypertrophy. The latter undoubtedly interferes with expiration more than with inspiration, though the vigor of the period of youth at which the majority of cases occur (fifteen to thirty years), and the yielding nature of the middle nasal passages, allow this effect to show itself but seldom. Concerning the diagnosis, this can be made without difficulty since the introduction of cocaine.

After using cocaine, simple swelling of the inferior turbinated body will disappear and merely the mucous membrane will be seen ; if posterior hypertrophies be present these will not disappear, but retaining their size more or less, they are

seen to project into the lumen of the inferior nasal passage. By the use of the probe we find that they are quite resisting, *i.e.*, it is difficult to cause pitting, but easy to lift and move them from the floor of the nose. The great abundance of fibrillary fibres combined with the crowding of the inter-alveolar structure with young cells, especially towards the periphery, accounts not only for the tension of these hypertrophies, but also for their peculiar color. While the rest of the mucous membrane covering the turbinated bodies presents all shades of red, the hypertrophies are always distinguished by their lighter color, which more nearly approaches an almost bright white, the more solid the hyperplasia is.

Posterior rhinoscopy is necessary for diagnosis when deviations or markedly developed spurs of the septum exist. Such an examination is the readiest and easiest manner of informing ourselves regarding the size and relations of the hypertrophy. In this way, we will only speak of posterior hypertrophy in cases in which the hyperplasia almost extends to the septum and obstructs communication with the inferior nasal passage; for only such cases will complain so as to render an examination of the nose desirable, and only such require energetic therapeutic interference.

Therapy is confined to the operative removal of the hypertrophied extremity. The proceeding which my *chef* practises in every case, is the application of the cold snare from in front, through the inferior nasal passage. This operation is by no means difficult, though it is called so by many authors (Moldenhauer, S. 83: "Removal of posterior hypertrophies is a very difficult operation," etc., or Zaufal: "Though the removal of the posterior extremities of the turbinated bodies is still a veritable snag to rhinologists."). With some practice, and when there are no deviations or long outgrowths from the septum which interfere with the view, the snaring-off succeeds almost without exception. It is different when the eye cannot follow the snare; in such cases, it is, perhaps, advisable to make use of the assistance of the other hand as is recommended by Hopmann and others; however, I have found, that the

manipulation in the pharynx is much more disagreeable to the patient than the removal of the obstructing deviations or spurs of the septum, so as to pass without difficulty from before backward to the posterior extremity.

If the obstructions to sight arise from the anterior and middle portions of the turbinated body, and are due to the existence of hypertrophies here, repeated use of the snare is naturally necessary, in order to effect a preliminary removal of these tumors. My *chef* has found delicate steel canulæ to answer admirably in the application of the snare; these have a diameter in front of not more than $2\frac{1}{2}$ *mm*, so that the wire is not interfered with in its movements, and comparatively uninjurious and very safe operating in the narrowest portions of the nose is permitted. The cautery-snare seems gradually to become abandoned by many rhinologists; Hopmann, Mackenzie, and Bosworth no longer employ it in posterior hypertrophies; the last-named, experienced American colleague expresses himself as follows: "For some time I have almost entirely abandoned the destructive agents for the ingenious little wire snare écraseur devised by Dr. C. Jarvis of New York. This instrument has enabled me to remove the offending tissues with less pain and less reaction and with much more satisfactory results than the more severe caustic agents," etc.

In any case, hemorrhage depends more upon individual tendency on the part of the person operated upon, than on the manner of operating; hitherto, none of our cases have required a tampon. As a part of the after treatment, a wad of cotton is introduced into the lower nasal passage and pushed back underneath the inferior turbinated body to its posterior extremity. The cotton is removed at the end of twenty-four hours; after a longer retention, thirty-six to forty-eight hours, we have observed septic infection with high fever, headache, etc. I do not understand, therefore, how Hopmann (*Monatsschrift f. Ohrenheilk.*, No. 1, 1888) can suggest leaving such cotton tampons in position for three to five days and longer, "until they become dislodged by themselves." The iodoform which Hopmann dusts into his tampons may prevent infection to a certain extent; but even

when using iodoform cotton, we have encountered the same marked disturbances in cases in which the tampons happened to have been left in for a longer period, as when ordinary dressing-cotton had been used; other colleagues seem to have had the same experience, according to their oral communications.

So as to insure the least possible injury consequent upon the wounding of the interior of the nose, patients are given a snuff after the third day; for this purpose I have found borax and salol by far the best. The pleasant odor of the latter is also grateful to the patient and aids the completion of the *cito, tuto, et jucunde* of our therapy.

TWO CASES OF CEREBRAL ABSCESS RESULTING FROM LONG-STANDING OTORRHŒA; OPERATION; RECOVERY.

(King's College Hospital, London.)

REPORTED BY URBAN PRITCHARD.

THE following cases, occurring within a short time of one another, exhibit so many features of interest, with regard to symptoms, operations, and results, that I need not apologize for recording them.

To my colleagues, Professors Rose and Cheyne, under whose care the patients were placed, I am much indebted for their kind permission to use the notes of the cases taken during the patients' stay in King's College Hospital.

CASE 1.—J. B., a draper, aged twenty-three. Had been subject to frontal headache and pain in the left ear from the age of six; for the last ten years there had been a discharge from the ear, and the headache had increased in severity.

In April, 1889, after catching cold, the ear discharge became more profuse, and the pain worse, and there were also a series of attacks of partial loss of consciousness, lasting some fifteen or twenty minutes, during which he lost all power of speech.

On June 17th he had a sharp convulsive attack, with marked twitching of the left side of the face, but no paresis and no loss of sensation ensued. The actual convulsion only lasted a few minutes, but he remained in a semi-unconscious torpid condition up to his admission to the hospital, and, the night before, had six "fits," during which he moaned, screamed, and threw himself about.

He was admitted to King's College Hospital, under Mr. Rose, on June 23, 1889.

When first seen, he was drowsy and incoherent, comprehending and answering questions with difficulty; there was an abundant purulent, offensive discharge from the left ear, tenderness on pressure most marked about two inches above the meatus, slight facial palsy; the tongue was thickly coated. There was no absolute optic neuritis, but the edges of the optic disc were somewhat vascular; no paralysis of the extremities, and tactile sensation appeared perfect.

The same day (23d), at 12.30 P.M., Mr. William Rose proceeded to operate. The skull was trephined at a spot two inches above and one half inch in front of the meatus—*i.e.*, over the tender area; the dura mater, which appeared to be quite healthy, was opened, but no pus followed repeated exploratory punctures into the brain substance with a trocar and canula. The trephine was then applied an inch behind the posterior margin of the original opening, and offensive pus was found outside the dura mater, which was of course left intact. By further use of the trephine and of the bone forceps this opening was enlarged, and finally, in order to make absolutely certain of free drainage, the trephine was applied, for the fourth time, over the occipito-parietal margin. The whole wound was then thoroughly irrigated with weak carbolic solution, and dressed with perchloride gauze.

After an operation of this magnitude, the patient, as might have been expected, was much collapsed, and long unconscious. His subsequent recovery was complete and uninterrupted, and was chiefly interesting because of the opportunity it afforded for observing the gradual improvement in his mental faculties. On June 27th he was unable to repeat or understand words spoken to him, but comprehended gestures, and could read. On 29th he was able to write for the first time. The wound healed perfectly, the discharge from the ear ceased immediately after the operation, but reappeared on June 29th. The mental condition gradually improved, and he was made an "out-patient" under my care on August 20, 1889. At this date there was still considerable discharge from the ear, and the tympanic membrane was perforated, these conditions only yielding to persistent treatment with alcoholic injections and instillations, insufflations of boric acid, and repeated removals of soft polypoid masses.

On March 27, 1890, his condition was as follows, viz.: The ear was quite healthy and dry, his general health good, and he did not complain of headache. Since recovering from the operation,

he has been subject to periodic attacks of aphasia, of about twenty minutes' duration; these attacks at first occurred about once a fortnight, but have gradually become much less frequent. Except for a certain slowness of speech, the survival probably of the imperfect cerebration, which was so marked a feature of his convalescence, he is, intellectually, quite clear and vigorous.

CASE 2.—A young man, aged twenty-six, a coal-porter, for the last seven or eight years had suffered from purulent discharge from the left ear, and on two occasions during this period was laid up with intense pain in the ear. These attacks lasted about a fortnight, and the last, in the spring of 1889, was associated with swelling of the left side of the neck.

On September 7, 1889, he was suddenly seized with intense pain in the ear and left side of the head, and the following day he appears to have had two distinct rigors; on September 9th he vomited, and there is a confused history of a "fit" occurring on the 10th, but this does not seem to have been associated with convulsions or twitchings of any sort.

He was admitted to King's College Hospital on September 11, 1889, under Mr. Cheyne.

During the first few days of his residence in the hospital there was a complete absence of those characteristic cerebral symptoms which formed so marked a feature in Case 1. He complained of intense pain in the head, the focus of which pain appeared to be over an area of about half an inch in diameter, situated in the left temporal fossa, just above the middle of the zygoma. He said he "felt ill," was disinclined to get out of bed, and when he did so, was giddy and hardly able to stand. On the other hand, the ear discharge was profuse, purulent, and offensive, the left membrana tympani was destroyed, and there were numerous polypoid growths springing from the middle ear. There was no optic neuritis, or paralysis of any kind. On September 14th the temperature rose to 101° (it had previously been nearly normal), in the evening there was considerable delirium, and during the night he vomited for the first time. Twitching of the left eyebrow and angle of the mouth was noticed the next day, when he became more delirious. On September 16th he was very noisy and delirious; the twitching was more marked; there was retention of urine; and he lay in an unconscious torpid condition. It was decided to operate at once. The skull was trephined at a spot one and a quarter inches behind the meatus and the same distance above the cerebral base line;

both bone and dura mater appeared to be quite healthy, but on exploration inward and forward about half an ounce of very fetid pus escaped ; the broken-down brain substance was removed, the whole thoroughly irrigated, a drainage-tube inserted, and the wound closed.

The relief which followed this proceeding was of a transient character, the patient soon became delirious again, had one or two severe rigors, and was very low.

On September 24th further exploratory punctures into the brain substance were made, but no other abscess was found. At the same time the mastoid cells were opened, but contained no pus.

On September 26th an inability to move the right arm and leg was noticed, but this disappeared the following day ; on the 30th there was distinct optic neuritis of the left eye, but on the whole he was better. On October 2d the track of the drainage-tube was freely dilated by means of a pair of long, thin sinus forceps. This led to the escape of about two drachms of pus.

From this date the general condition of the patient slowly improved. "Word deafness," very similar to that described in Case 1, was also noticed here, but was a much less prominent and persistent symptom. On October 3d his temperature fell to normal, and remained so ; he read slowly, but distinctly, on October 5th, and by the 24th of November the optic neuritis had disappeared.

The patient has since been attending as an "out-patient" under my care, but the otorrhœa, polypoid growths, etc., though much improved, have not yet yielded to the treatment which has been so successful in Case 1, but this no doubt is explained by the discovery of bare bone in the tympanic cavity.

When seen on April 10, 1890, his mental condition and general health were perfectly satisfactory in every respect, and he was able to do his work quite well. On two occasions since his discharge from the hospital he has had attacks of unconsciousness, each lasting from twenty minutes to half an hour, and the second of these attacks being preceded by some aphasia.

A CASE OF OPERATION FOR EXOSTOSIS OF THE EXTERNAL AUDITORY MEATUS.

By TH. HEIMAN, of Warschau.

Translated by Dr. H. A. B. McCauley.

(*With three figures.*)

IT is a well-known fact that exostosis of the external auditory meatus may exist unaccompanied by marked symptoms. Indeed, when the ear is healthy and the hearing normal, the afflicted person may be unaware of the existence of the disease. Such cases are more interesting anatomically than clinically, and treatment is quite superfluous. In cases where they attain such dimensions that the lumen of the meatus is almost or quite obliterated, deafness and unbearable noises may result upon the one hand, or, when there is pus in the middle ear, its free exit is hindered, thus leading to retention of the secretion and sometimes death on the other.[1] The case observed by me might easily have terminated unfavorably but for its timely operation, and, to a certain extent, it gives us the landmarks as regards operative interference.

Mr. A., twenty-six years old, no hereditary or constitutional dyscrasia. When seven years old he felt a pain in his left ear for the first time, which disappeared in a few days. This occurred again in his fourteenth year, and terminated in the same way. This time there was a slight discharge. In 1881 patient complained of pain, accompanied by a free flow of pus. As this condition persisted for several months, and the discharge was foul-

[1] The case of G. S. Munson. These Archives, vol. xi., p. 229.

smelling and sometimes bloody, the patient consulted Dr. Prussak, of St. Petersburg. Polypi in the tympanic cavity were discovered and one of them removed at once ; patient's condition did not improve, however. During the following three weeks other polypi and granulations were removed from the tympanum, but the discharge still persisted. The patient then, tired of this long and painful treatment, decided to do nothing more, and trust to luck. In August, 1888, however, he noticed that the discharge was not so copious, and at the same time suffered from violent headache in the corresponding temporal and occipital regions, and, becoming frightened, determined to seek medical advice. I saw him for the first time at the end of August. Examination at that time resulted as follows : slight paresis of the left side of the face ; slight percussion of left temporal and mastoidal regions painful. The bony external meatus is occluded by a tumor which almost entirely fills it up, leaving only a small chink, which is also stopped up by a red mass which bleeds easily. The tumor, when felt by the sound, is hard like bone, painful and immovable, its broad base corresponding to the upper and posterior part of the canal. The skin covering it is somewhat reddened. A slight purulent secretion is seen upon the walls of the meatus. It is impossible to clean the deeper regions of the ear. Upon inflation of the middle ear, a quantity of offensive pus oozes out through the chink, and the patient feels relief in the head. The hearing upon this side of the head is greatly lessened, and the watch is heard neither through the bones nor through the air. C is not heard by aërial conduction, but, with the fork upon the mastoid process or crown of the head, is perceived by the left ear. Rinne (—). Loud conversation is hardly heard at 10 *cm* from the ear. The right ear is normal, functionally as well as anatomically.

With such marked objective symptoms the diagnosis was not difficult. We had to deal with chronic purulent granulating middle-ear inflammation of the left side, with almost complete retention of pus due to exostosis of the external meatus, which latter I regarded as consecutive. In consequence of the retention of the secretion, an irritative process had been set up in the dura matter of either a congestive or reflex nature, manifesting itself in headache and vertigo. The first and, in fact, the principal indication in our case was to open up the canal in order to allow the pus to drain off,

and, secondarily, to remove the granulations and effect a cure of the process in the middle ear. The first indication could only be met by removal of the exostosis, but the patient would not give his immediate consent to such an operation, so I tried slow dilatation of the auditory canal, hoping to cause gradual disappearance of the tumor, to a certain extent. With this end in view, I applied tampons of absorbent cotton,[1] pressing them gradually deeper into the meatus, and also painted the tumor with iodine and glycerine (1 : 2) and nitrate of silver (1.0 : 8.0). This treatment was inefficacious and a waste of time, as well as very painful. Finally, about the end of January of this year, my patient decided to submit to the operation, which I performed at the military hospital here in the presence of the consulting and the visiting staff.

The patient was chloroformed until deep narcosis prevailed. External meatus disinfected by a 1:1000 solution of corrosive sublimate, and a superficial incision was made with a bistoury through the entire length of the tumor in the direction of the axis of the canal. The tumor was then laid bare and gouged off with two or three strokes of the hammer, beginning ½ *mm* in front of its base, so that a thin lamella of the posterior bony wall was removed with it, for at times the removal of the exostosis alone is very difficult (Knapp) and the operation may require more than one sitting. There was a great deal of hemorrhage, which obscured the field of operation, and in consequence of this a small ridge of bone situated at the lower portion of the canal, at its junction with the middle ear, was overlooked. This narrowed the passage somewhat, but was thrown off in the shape of a small sequestrum in about two weeks. The tumor was 7.5 *mm* long, 6 *mm* in breadth, and 5 *mm* high, composed of spongy bony tissue, excepting the external layer, which was compact. The operation lasted twelve minutes. Owing to the great hemorrhage the granulations were not removed at the time and the condition of the *Mt* could not be observed. The auditory canal

[1] I have not used sponge tents or laminaria digitata for years for the dilatation of the auditory canal. The results obtained by this method are of short duration, and the process is very painful; and in one of my cases treated in this way the pain was so violent that the patient, a soldier, suffered from trismus and tetanus, lasting three days, which was finally overcome by warm baths and large doses of chloral hydrate per rectum.

was then syringed with a four-per-cent. solution of boric acid and well tamponed with iodoform gauze. Forty-eight hours afterward I changed the first bandage and substituted a rubber drainage-tube for the tampon, in order to prevent the canal from closing again. The tympanic cavity was full of granulations and polypi. During the first week the slightest touch upon the bony wound with the sound or even a softer body (rubber tube) caused marked vertigo and almost unconsciousness (this was evidently reflex). The bandage was changed every two days, and the wound healed normally. The secretion of pus was at first copious, coming partly from the bony wound and partly from the middle ear, but almost entirely disappeared in two weeks, and the pus secreted thereafter was entirely from the middle ear. There was no fever whatever. In four weeks after the operation, the patient was walking about and all symptoms had disappeared. The head was quite free, which had not been the case for five years. The bony wound healed in four weeks, leaving the canal normal, so that I removed the rubber tube and put in a simple tampon. During the first four weeks the treatment consisted of careful cleansing of the ear with four-per-cent. boric acid solution, after which a compress wrung out in corrosive sublimate (1:2000) was applied, a piece of dry cotton placed upon this, covering the temporal region, and the whole held in place by a flannel bandage. Later, when the wound had healed and the drainage-tube was removed, I merely syringed the ear with the above-mentioned solution of boric acid and a simple tampon of absorbent cotton. Throughout the entire treatment, and also whenever the bandage was removed, the ear was inflated, in order to remove any pus which may have been retained. I examined the patient about the sixth week and found the external meatus normal, very little suppuration, and the entire tympanic cavity covered with granulations of different sizes. These were removed in three sittings at intervals of four days, by means of Blake's snare, after which the galvano-cautery was applied to the remaining base. Suppuration ceased entirely in a short time, the inflammation of the middle ear disappeared, and the upper part of the *Mt*, with the handle of the malleus drawn well inward, became visible. There was a total defect of the *Mt* at its lower half. Each time I removed the granulations I blew powdered acid into the ear and found it still quite dry at the next sitting. The hearing of the left ear was now found to be much better, and the ticking of the watch is

heard at 1 *cm*, C. at 3 *cm*, and ordinary conversation at three metres. The patient called again four months after the operation; the external meatus was of normal width throughout its entire extent, and a large ear-speculum can be introduced easily. Up to the present time there has been no discharge from the ear, although the patient, in the discharge of his duties as military engineer, is exposed to the changes of the weather and remains in the open air all day long. He has never felt so cheerful and well, and has no uncomfortable symptoms. The picture presented by the *Mt* and the tympanic cavity is the same as before.

It may be well to mention at this point that for the past two years I have used galvano-cautery in cases of otitis media suppurative chronica, in which, after removal of the granulations, the suppuration did not cease, and have found it very beneficial. Ordinarily the secretion becomes rapidly less copious, and disappears entirely after cauterization of the bases of the granulations. This method, however, is not successful when caries exists, but this may be due to the fact that it is not always possible to get at the carious spot itself and burn it out entirely. The case described above is one of the few of its kind ever observed by me. Although exostosis is said to be a frequent disease, and according to C. O. Weber the ear its favorite seat, I have seen very little of it in nine years of civil and military practice.[1] Perhaps this is an idiosyncrasy of the people of my locality. I have had only about ten cases in all, and the above was the only one in which an operation was the proper indication. In my nine other cases the exostosis was situated upon the superior posterior wall of external meatus. I have only seen it once upon the anterior wall. All my cases were in males.

In the literature of the last nine years, over seventy cases of exostoses of the ear are cited, and this number does not seem to be great in proportion to other aural diseases. On the other hand, these growths would seem to be of more frequent occurrence in America than in Europe, for Virchow observed them in the skulls of old Peruvians and Walker

[1] Up to the present time I have treated eighteen thousand cases of ear-disease.

saw them often among the transatlantic races, the aborigi-nals of Mexico for instance. Blake also reports that they existed in twenty-five per cent. of the "mound builders" examined by him. The etiology in our own case is obvious. It was the result of an inflammation in the middle ear which irritated the periosteum of the auditory canal and caused at first a hyperplastic inflammation of it, which subsequently culminated in the neoplasm. It seems certain that the condition could not have been congenital, for otherwise the physicians who treated the case could not have failed to perceive it, neither could instruments have been introduced into the ear for the purpose of removing the granulations. Apart from congenital exostoses, which are due to partial hyperplasia during the period of development and ossification of the external auditory canal, and also those of traumatic origin (Wagenhäuser), I am inclined to think that all exostoses are due to local irritation, resulting in hyperplastic inflammation. That they are dependent to a certain extent upon arthritis, syphilis, scrofula, rheumatism, and other general diseases cannot be denied, but these diseases are certainly of subordinate importance and merely to be considered because of their deleterious influence in general upon inflammation and suppurative processes in the middle ear. It is hard to decide whether the abuse of alcohol (Toynbee, v. Troltsch) or sea baths (George Field) has any causative influence. Schwartze and Delstanche *fils* believe in heredity.

I think the best operative method is to chisel them off, for I am convinced that this procedure is quicker and easier than any other, but I think it advisable to also remove a small portion of the canal wall with the tumor, in order to avoid complications which may arise during the operation. The only objection to this method is that the hemorrhage masks the field of operation, but notwithstanding this, it is to be preferred to all others and is used by most aurists (Brenner, Schwartze, Lucae, Aldinger, Heinecke, Cassels). Boring through with a drill such as is commonly used by dentists, and then introducing blocks of lead and ivory, is much more tedious and not so safe. The galvano-cautery (Voltolini, Delstanche) would be very good, for the operation would be

bloodless, but it would take too much time to remove a large tumor with a broad basis (as in my case) by this method.

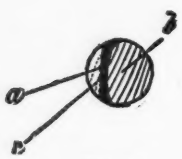


FIG. 1.

FIG. 2.

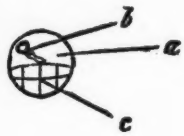


FIG. 3.

FIG. 1.

a. = Chink representing the remains of the calibre of the external auditory meatus.
b. = Exostosis.
c. = Anterior wall of auditory canal.

FIG. 2.

a. = The obstruction of the external auditory meatus which still remained after the operation.
b. = Tympanic cavity filled with granulations.
c. = Anterior wall of auditory canal.
d. = Ridge of bone persisting after operation.

FIG. 3.

a. = *Mt.*
b. = Malleus.
c. = Cavum tympani.

PROGRESSIVE DEAFNESS (SCLEROSIS) AND ITS TREATMENT BY TENOTOMY OF THE TENSOR TYMPANI.

By Dr. CHOLEWA of Berlin.

Translated by Dr. J. A. Spalding, Portland, Me.

(*With four wood-cuts in the text.*)

TWENTY years ago Professor Weber-Liel published a paper on tenotomy of the tensor-tympani muscle, recommending to the profession the surgical treatment of a disease which, though so very frequent, still offers the greatest difficulties in the way of successful treatment. Despite the clearness of his demonstrations, and the undeniable success of his new suggestion, he failed in inducing otologists to follow in his steps. Whether his expectations were too great, or the performance of the operation by those who attempted it was far beneath the skill with which I personally witnessed the author perform it, the operation fell into oblivion, and was rejected as utterly useless and even as injurious.

While I was making some tuning-fork experiments last spring, the question arose, whether this operation were not after all the very best that could be done in those cases of sclerosis of the tympanum with a relatively good bone-conduction, and whether it might not improve the function of the intra-tympanic and muscular apparatus for the perception of sound, words, and speech. The tenotomies that I have since performed prove that in many cases of intra-tympanic and labyrinthine processes, all of which lead

to deafness, the operation is very useful and rarely or never injurious if carefully performed. I should scarcely have ventured amidst the universal discredit of the operation to appear in public with a report of the results that I have obtained, were it not that a recent paper by Professor Kessel[1] has made me feel that I am not alone, and that men of renown in otology do not all unite in the anathema that has been pronounced against the operation of tenotomy of the tensor-tympani muscle.

Weber-Liel is about right when he says that one fourth of all our aural patients are affected with sclerosis. In Dr. Hartmann's clinique of 2,627 ear patients during a given period, 322 suffered from sclerosis, only one in seven indeed, but Hartmann's clinique is largely attended by children who rarely suffer from sclerosis. Further, a large number of cases indexed as "catarrh of the tubes" may actually belong to the class affected with sclerosis of the middle ear. I would add that both sexes were about equally represented.

What is sclerosis? Is it, as was once asserted, the result of chronic tubal catarrh, or naso-pharyngeal catarrh, or is it a pure neurosis of the fifth pair, and further, of the sympathetic?

I think that both causes may be at play, that each alone suffices to produce the symptoms of sclerosis, that each may exist alone, but that both combined excite the worst forms of the disease, and the secondary disturbances in the labyrinth.

Hartmann insists that there are two forms of sclerosis, one beginning with hyperæmia of the tympanum, and the other without this symptom, but with so early a labyrinthine disturbance, that we feel as if the disease must have been trophic from the start in both the middle ear and the labyrinth.

Weber-Liel remarks that the development of a large number of the most dangerous and progressive cases of deafness introduced with subjective sensations of hearing, is due not alone to primary or secondary affections of the mucous membranes of the middle ear, or of the muscles, bones, or

[1] Thüringer: *Correspbl. d. allg. Ærtze-Verein*, No. 7.

tendons, but particularly to affections of the nerves that nourish this region or stand in close connection with it.

Kessel has lately stated that sclerosis is characterized by great resistance in the mechanical apparatus, "mechanical deafness," or by organic alterations in the nervous terminal apparatus—"nervous deafness."

Although the latest views would seem to prove that anchylotic alterations in the mechanical apparatus are the chief cause of progressive deafness, my tuning-fork tests would seem to show that such is *not the case* at all. I was struck with the fact that in fifty-three cases of sclerosis, the fork was heard better in the better ear (from the vertex, not from the forehead) forty times, whilst the opposite was noted but thirteen times. This was all the more noticeable, if the aërial conduction had just before been temporarily increased by Politzeration, and it often appeared that when previously Weber's test was positive for the worse ear (perhaps from excessive concavity of the *Mt*) the tuning-fork ($c - c^4$) was heard better in the less affected ear. The following curves (See p. 154) will give a better idea of the results of the tuning-fork tests. The first shows pure sclerosis in both ears, the second pure sclerosis in the right ear, whilst the third was one of anchylosis, as the result of the tenotomy proved.

What does this observation teach? Our tuning-fork tests prove that in most cases of sclerosis, bone-conduction is equally reduced in both ears. The aërial perception in both ears is greater than the bone-conduction, and in following the general usage, so far as a whisper is heard at less than 1 *m* we could consider the positive result of Rinné's test as proof that the labyrinth was affected. So, too, for the ear in which a whisper was heard more than 1 *m*, I claim the diagnosis of labyrinthine disease, because the bone-conduction in the worse ear is much reduced. This, then, is a case with both ears equally affected, in which the better aërial conduction in one ear simply proves that the labyrinthine affection is more recent than that in the other, or that the action of the muscular apparatus is less unfavorably affected. Therefore according to the axiom, "In nerve affections the fork is heard better from the vertex in the healthy or in

the less affected ear," we could exclude all obstacles to conduction not only from the ear most affected but from both.

We noticed further, and this so far as I know has never been particularly emphasized, that in neuropathic sclerosis, as I will call it, *the anæsthesia of the Mt is always pronounced*, and that the worse ear offers the most anæsthetic *Mt*. Contrarily, the better the hearing, the less the anæsthesia, and

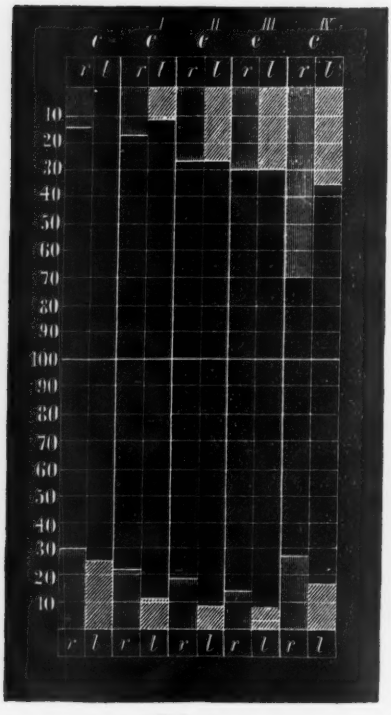


FIG. I.

Curve I.
Bilateral neuropathic.

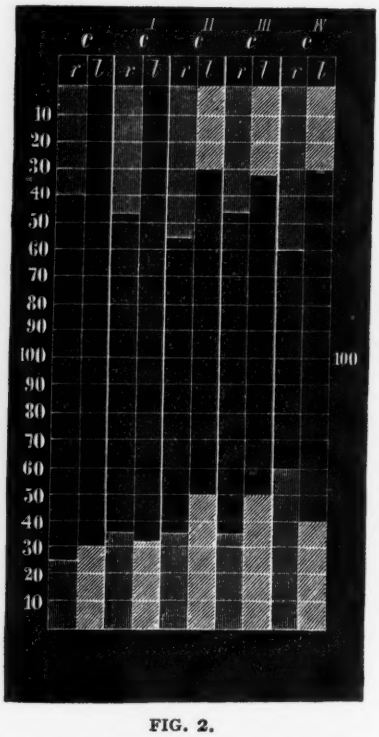


FIG. 2.

Sclerosis Curve II. Right: Neuropathic sclerosis; Left: anchylosis; Rinné, R + Left —; Weber, normal L; operation left. Hearing before, 0.36; after operation, 6 *m*.

the more the aërial as well as bone-conduction had suffered, the more marked and the more extensive the anæsthesia of the entire *Mt*. Hence, for the very reason that the objective examination almost always leaves us entirely at sea, this symptom of "equivalent anæsthesia" is to be highly recommended as one of the chief diagnostic points in the diagnosis of neuropathic sclerosis.

The following remarks are preceded in the German edition by a tabular synopsis of twenty-seven operations. Adding three more of recent date, there are five failures in thirty operations.

The cases that I have seen show how rarely the tuning-fork is perceived in the worse ear, in sclerosis; how rarely, too, anchylosis and adhesions are found as obstacles to conduction. We see, however, in consonance with the results of our treatment, that even where all the symptoms indicated such an obstacle in the worse ear, it actually did not exist. But calcareous concretions and cicatrices may have the same effect. If this had not been so, the hearing could not have been so rapidly and so greatly increased directly after the tenotomy, as was often the case and as was actually demonstrated in nine others. We see further, as has been lately emphasized by Weber–Liel and Kessel, that when the operation was done on the ear that had previously been shown to be the worse of the two (tuning-fork tests), with probable anchylosis of the ossicles, and was of no benefit at all to that ear, nevertheless the hearing of the other ear was decidedly improved. Therefore we have the right to declare, as Weber–Liel and Kessel assert, that tenotomy of the tensor tympani may be very beneficial in many apparently hopeless cases of progressive deafness. If, moreover, Kessel tells us that the operation is useless in the last stages of chronic catarrh, I grant that he is, on the whole, correct, still unfortunately most of these patients first apply for aid when they have lost their positions from deafness, and are grievously afflicted with tinnitus. Therefore, I see no reason why we may not even then try something. Kessel, however, proposes to perform the tenotomy at rather an early stage in sclerosis in recent catarrhs, and so far as my experience goes, I highly approve of the suggestion. Then there is another set of cases in young people (fifteen years of age), especially after catarrhal inflammation of the ears, in which the hearing is never improved despite the greatest care of the naso-pharynx. The bone-conduction is good, perhaps too good, but if we touch the *Mt* we are surprised at its extraordinary lack of sensitiveness. We observe the same thing in rather

older patients (seventeen to nineteen) who come occasionally for a "fulness" in the ears. The latter are called cases of swelling of the tubes, though at a later period of life they undoubtedly swell the ranks of those who have become deaf from genuine sclerosis of the middle ear. In these cases too, taking every symptom into consideration, and excluding syphilis, an early tenotomy is advisable, and all the more since the operation is not very severe, and is equally well borne both by young and old.

The following indications for the operation may prove valuable to others.

Indication I. Cases of progressive deafness; the so-called "neuropathic sclerosis" should be operated upon when the bone- and aërial conduction have not fallen too low. I have not yet been able to fix the precise point in bone-conduction at which we ought to interfere, because this form of conduction depends partly upon the age of the patient, and partly upon the use of higher or lower or differently constructed tuning-forks. A tuning-fork c—c^3 ought to be perceived for at least eight seconds, if we are to hope for a favorable result from the tenotomy. So far as the aërial conduction is concerned, various tuning-forks are heard for different periods of time, but I should say on the whole, that the operation would not be successful unless at least *one quarter of the normal duration of perception was still preserved.* Thus if the normal ear can hear the tuning-fork c, c^1, c^2, c^3, c^4, for 50, 48, 40, 56, and 42 seconds respectively, then with exception of c, which is rarely perceived at all in this disease, c^1, c^2, c^3, c^4, ought to be heard for 16, 13, 18, and 14 seconds respectively, before we can hope for benefit from the operation. Still, no absolute data can be given and we must determine in every individual case, the proportion between bone- and aërial conduction, and the other conditions of the ear. As we have already seen, the tuning-fork in these cases will always be heard better from the vertex in the better ear, and this symptom indicates to me that both ears are free from anchylotic alterations, and therefore that the operation can be performed in either ear. It is well to remember in this respect that we ought, as Weber-Liel has

suggested, always to operate first in the ear that is more affected, especially since we know that the operation is often of great benefit to the ear that has not been touched. Further, we should be sure that the naso-pharynx is in good order, for if the treatment directed to that has been useless, or if anatomical alterations have permanently occluded the tubal orifices, there will be but slight hope for restoring the hearing by the proposed tenotomy.

Indication II. The operation should be done on the worse ear, where the positive result of Weber's test and the negative result of Rinné's test make us suspect permanent obstructions to conduction in this ear, whilst of this condition there is no trace in the better ear. I have seen excellent results from tenotomy in these very cases of unilateral anchylosis. Unfortunately we do not always have such simple cases as these to deal with; some cases are extremely difficult to diagnosticate, particularly in bilateral anchylosis, or anchylosis of one ear and advanced sclerosis of the other. This is especially so in the latter category, where the bone-conduction in both ears is well preserved, the aërial conduction greatly reduced, and Rinné's test negative in the lower octaves but positive in the higher. Weber's test, too, will give different results at different times; the watch and the whispered voice will be heard in both ears, or the former will not be heard at all and the latter but poorly, so that we shall be working entirely in the dark so far as the choice of operating on either ear is concerned. The only thing that we then can do is to test again and again with the voice and the watch and the tuning-fork, and to call in the aid of the pneumatic speculum, and then by comparison of the various tests we may be able to construct some precise idea of the actual condition of things. It may be objected that no success can be expected where the whispered voice cannot be perceived in either ear at $\frac{1}{3}$ *m*, and therefore that the tenotomy ought not to be done. But if we wish to obtain experience in regard to all the possibilities of the operation, if we wish to rescue desperate cases, or at least to hinder for a while the obstinate onward march of the disease, these are the very cases that demand the operation. For we

cannot expect that a few individuals afflicted with interesting diseases of the ear are going to favor us by dying at just the right stage in their disease in order that we may advantageously study the condition of the parts *post mortem.* By far the better plan in my opinion is to get this information from the living and at first hands, and this we can do by comparing the results of the tuning-fork tests before and subsequent to the operation.

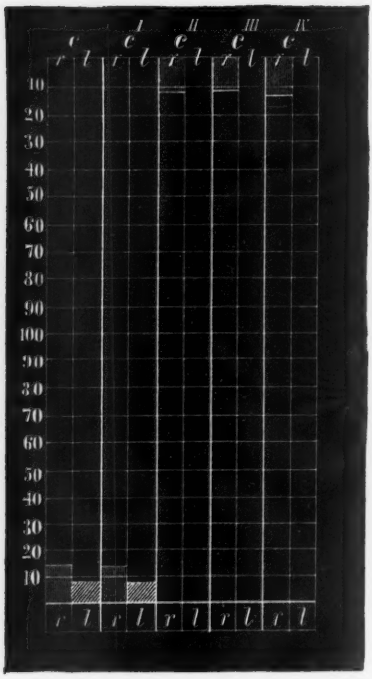


FIG. 3.
Curve II.

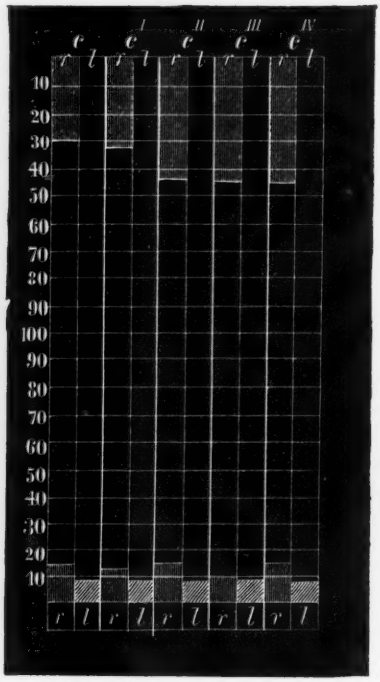


FIG. 4.
Curve III.

The following case shows what we may expect from tenotomy.

I examined, about a year before, a man of sixty-one, who heard in the left ear a very loud voice at about three inches, and in the right ear from six inches to a foot. He had long been treated in vain with potass. iod., catherization, etc. He was on the point of being discharged from his occupation because he could at this time no longer understand what was spoken to him; every order

had to be communicated to him in writing. The tinnitus in both ears was very distressing; the tuning-fork tests (compare curves I. and II.) show what a poor prognosis we had for the operation. Rinné's and Weber's tests could not be used. The only diagnosis that I could make was anchylosis, with an extensive labyrinthine lesion in the left ear, and in the right ear advanced senile sclerosis. The choice of ears was easy, for the man was hopelessly deaf in the left ear. In reality, however, I operated more to hold out some flattering hope than with any expectation of improving the hearing. But the result was unexpectedly good, for to-day, three months after the operation, he can still hear a whispered voice at 2 *m*, and perform his duties as of old. The left ear remains hopelessly deaf, but the tinnitus has decreased since the operation.

Indication III. If one ear is totally deaf, and the other is growing deaf, the operation is advisable on the latter, on the ground that reduction of the tension in one side of the muscular apparatus will benefit that of the other.

Having now given some suggestions in regard to the rationale of tenotomy of the tensor tympani, which I hope may induce others to study further in this direction, I will say a few words in regard to the method of operating.

Although I have not here at hand a description of Weber-Liel's operation, yet I have personally seen him operate, and watched how he, *in ignorance of the anæsthesia of the Mt* in sclerosis of the middle ear, gave to the operation a terrifying aspect, by compelling the patients to be tied hand and feet to the operating-chair. Of course it is necessary to have the patients quiet, and for this reason I have experimented with a long list of materials in order to increase the abnormal anæsthesia. The best results were obtained from strong solutions of alum, acet. tart., and various varieties of ethers, which after being taken up with absorbent cotton were placed upon the *Mt* and left to remain till they evaporated, and thus additionally anæsthetized the locality chosen for the operation. If this spot were originally anæsthetic, I was, after the use of these agents, sure that the anæsthesia had so far increased that it needed only the support of a friend in order for the surgeon successfully to place

the incision at the proper position. These solutions, though not at first used with this intention, have nevertheless had a slightly aseptic effect upon the *Mt* and meatus. At a later date I attempted to produce additional asepsis of the tubes and tympanum by passing a drop or two of menthol through the catheter just previous to the operation. I have found this method useful where catheterism was tedious, and after many hundreds of operations of various sorts, I have never met with any disagreeable reaction in the tympanum. I hardly need mention that the operation ought not to be performed during suppurative naso-pharyngeal catarrh, and that it ought never to be done at all in any case until frequent tests of the hearing by the voice, the use of the tuning-fork, and the pneumatic speculum have given us a comprehensive idea of the possibilities of the ears.

In performing the operation I use Weber-Liel's original instrument, with a slight modification of the cutting blade. The incision is always made in the anterior segment of the *Mt*, close in front of the short process of the hammer, the slight hemorrhage quenched, and pulverized boric acid strewn thickly over the *Mt* and allowed to remain until the incision has cicatrized. A forcible catheterization with a drop of menthol terminates the procedure. I have in this way succeeded, without exception, in obtaining recovery by first intention in a very few days, and I can truly say that I have never harmed a single patient treated in this manner.

The few cases that I have seen and the brief period of observation do not permit us to draw any trustworthy conclusions in regard to the DURATION of the improved hearing, but we have the right to rejoice that, even if but temporarily, such excellent results have been obtained. I am firmly convinced that the operation will increase the reputation of aurists amongst the laity as well as the medical profession generally, provided that the necessary limitations for the operation shall have been previously discovered in every individual case by searching and scientific tests.

BEZOLD'S FORM OF MASTOID DISEASE, AND THROMBOSIS OF THE LATERAL SINUS.

By Prof. S. MOOS.

Translated by Charles H. May, M.D.

(*With plates iii. and iv. of vol. xx. German edition*, 1889.)

As is well known, Bezold, an investigator identified equally with scientific and with practical otology, was the first to call attention to the fact that a mastoid abscess might open toward the digital fossa or upon the internal (medial) surface of the mastoid process, instead of externally. An anatomical disposition to such a course exists in those cases in which the lower portion of the mastoid process consists of a single large pneumatic cavity or of several such spaces, bounded internally only by a thin layer of bone.

This rupture internally is favored by a compact outer wall of the mastoid process, *i.e.*, by an increase in the resistance which the pus encounters in this direction. The pus which has escaped internally then accumulates beneath the cervical fasciæ, which together with the overlying thick layers of muscle prevent its coming to the surface. As a result, painful infiltrations and large abscesses of the lateral cervical region, produced by gravitation, occur (Bezold, Burckhardt-Merian, Politzer).

The diagnosis may be difficult, especially in the early stages. A hard, painful swelling in the retromaxillary fossa, often even devoid of redness, may be the only symptom at the commencement, the mastoid process being apparently

unchanged, without any infiltration of the overlying integument, and even showing scarcely any sensitiveness to pressure, though usually this is elicited upon percussion. Elevations of temperature may be absent in the early stages, or may be transient and insignificant.

Up to the present time, I have operated upon four such cases, all of which occurred in males between 24 and 53. Three of the cases were certainly referable to recent purulent affections of the middle ear. My experience in all of these four cases leads me to place this form of mastoid disease among the most serious. In the first two cases the sclerosed mastoid process was chiselled away to the extent of about one *cm* in diameter; in both cases pus was encountered after division of muscles and fasciæ. The first case was complicated by chronic tuberculosis with the formation of cavities, recent hæmoptysis, paralysis of the facial, and a large abscess by gravitation upon the affected side of the neck. The operation was performed on account of the existence of excruciating pain and not as an *indicatio vitalis;* it was successful as far as the relief of pain was concerned. Death resulted four months later in consequence of extensive pulmonary tuberculosis.

In the second case there was paralysis of the facial, the formation of polypi in the middle ear, and destruction of the drum membrane; *the mastoid region was absolutely unaffected* except that it was sensitive upon percussion; there was a swelling in the retromaxillary fossa. The relatives refused their permission to operate on account of the normal condition of the mastoid region. An abscess by gravitation in the neck was prognosticated, and when, after some weeks, it really appeared, a request for the operation was made. In relation to the communication between the interior of the mastoid process and the abscess cavity in this case, it is worth mentioning that after the operation succeeded in reaching and emptying the abscess by gravitation as in the preceding case, severe hemorrhage from one of the large veins surrounding the abscess was controlled by pressure, but this was accompanied by an immediate escape of venous blood from the external auditory canal of the affected

side. The after treatment lasted several weeks without any pain or any elevation of temperature. Death resulted after previous manifestions of cerebellar abscess (probably in the vermiform process): severe vertigo, worse when erect but present even in the quiet recumbent posture; vomiting, obstinate constipation. No autopsy was allowed.

The third case, particulars of which were given elsewhere, died from septicæmia. On account of the great difficulty in chiselling away the mastoid process, I concluded that in any subsequent cases of Bezold's form of mastoid disease I would simply open the antrum, hoping to meet the indications by this easier method. This was done in the following case:

Otitis media purulenta of the left side (acute or chronic?); swelling in the retromaxillary fossa, and longitudinal narrowing of the external auditory canal, the only symptoms of mastoiditis. Pyæmia before and after the operation—a symptom of thrombosis of the lateral sinus. Operation with chisel and mallet in the customary manner. Recovery.

W. L., a pretty strongly-built farmer, forty-nine years old (brachycephalic), presented himself at the clinic April 2, 1889. He claimed to have been free from aural trouble before (!). For the past six weeks he had had pain under the left ear. Upon admission there was no pain in the ear nor in the mastoid process, but mastication is painful on the left side. There is pain upon pressure in the retromaxillary fossa, which presents a small, hard swelling, but no redness. There is also some swelling of the left zygomatic region. The mastoid process is pale, not swollen, not sensitive to pressure, but percussion causes pain. Moderate suppuration from left ear; longitudinal narrowing of the external canal caused by a non-fluctuating swelling of the postero-superior wall. Small amount of pus. By means of a very narrow speculum forced through the canal, sufficient illumination is obtained; the greater part of the left membrana tympani is destroyed; the wall of the labyrinth is swollen, not reddened, and is covered by a small amount of pus. A more careful examination of the general condition of the patient revealed the fact that he had had eight chills at home, each lasting from five to twenty minutes, had had hemicrania, vertigo, and constipation, the last having continued. No fever to-day. During the following days he was given infusion

of senna and Epsom salt in alternate doses; this treatment was successful only after copious rectal injections of water.

April 5th.—Incision down to the bone through the swelling in the external auditory canal. Hemorrhage, but no pus. The longitudinal stenosis persists. Fever in the evening.

April 6th.—Chill, violent headache, and vertigo. No pupillary changes. Icebag. Cathartic. Slight remission.

April 8th.—Opening of mastoid process with straight chisel, under anæsthesia. Incision through integument parallel to and 1 *cm* behind the insertion of the auricle. Periosteum thickened. The chisel was applied at the level of the *spina supra meatum*, and an opening made from above and behind, downward and forward, to a depth of 2 *cm*, when the collection of pus was reached. Irrigation with sublimate solution. An attempt was made to have the solution pass into the middle ear and out through the external canal, but it was unsuccessful. *This negative result existed throughout the entire treatment.* Iodoform gauze dressing. Patient was very restless during the night. The next morning he had a chill. The tendency to constipation persisted and necessitated rectal injections daily. The changes in the wound proceeded normally. The course of the fever is shown in the accompanying temperature-chart, as are also the repetitions in the chills (maximum temperature, 41.9°), which gradually diminished in duration, this being accompanied by a gradual, slow diminution of the maximum temperature. Greatest difference in extremes of daily temperature = 5.7° (!).

April 19th and 20th.—Feels comfortable. Headache and vertigo have disappeared. Absence of fever during these two days. Narrowing of canal is less marked. Dressings are changed daily; the wound is granulating nicely. Patient is allowed to go home to satisfy the urgent solicitations of his relatives. Dr. Steffan continues the treatment. The pyæmic manifestations lasted until May 9th (see temperature chart), hence their duration was just one month.

May 19th.—I saw the patient at his home with Dr. Steffan. The wound was almost healed. The external canal was still somewhat narrowed, and there was still a slight discharge of pus. His appetite and sleep have been good for the past two days. Tendency to constipation had persisted. Patient was still quite weak and his temperature was subnormal. Pulse, 60. Subjective examination was satisfactory.

Throughout the entire disease the urine continued free from albumen. The pulmonary and abdominal organs had been examined repeatedly, at times by myself, by my assistant, Dr. Schliferowitsch, and by Dr. Steffan. Despite the existence of cough with brownish expectoration (blood-globules, nuclei, and epithelial cells), commencing April 11th and lasting several days, no secondary deposits could be demonstrated physically, nor could such deposits be demonstrated in the spleen, resembling in this respect a case of pyæmia complicating otitis treated by Friedreich and myself.[1] So that in the present case we could also assume that the deposit in the lungs was either placed very central or was so small in extent that it could only be suspected but not be diagnosticated with certainty.

I will add a few short observations in answer to the question whether we should trephine the mastoid process in cases in which we suspect or are certain of the existence of thrombosis of the lateral sinus.

As is well known, thrombosis of the lateral sinus may be recovered from, whether it be the result of otitis or not,[2] if the patient overcomes the consequences of the breaking down of the thrombus. Either the canal of the vein finally becomes free through total breaking down of the thrombus and restitution of normal circulation, or the thrombus becomes united with the vein into a solid cord and a sufficiently extensive vicarious outflow results through the immensely dilated emissions (Zaufal's observations).

These experiences would lead us to believe that the thrombus and the pyæmia due to its breaking down would be more apt to heal if the cause were removed. The latter is to be found in the pus retained in the mastoid cells. If we remove this pus the chances of a natural recovery are much improved. Therefore, in such a case I would not

[1] Ueber pyæmische Zufälle im Vorlaufe und nach der Heilung einer acuten eitrigen Pankenhöhlenentzündung. *Zeitschr. f. Ohrenheilk.*, Bd. xi., S. 242.

[2] Gerhardt described such a case in detail in the *Wiener med. Wochenschr.*, four years ago: with Dr. Wack, of Neustadt, I also treated a case of pyæmia as a result of thrombosis of the lateral sinus resulting from otitis, and the case resulted in a cure. The maximum difference of daily temperature amounted to 4.2,°

hesitate to operate; the result of the operation may be considered doubtful by the relatives of the patient, and it really is so.

The favorable course of the operation, notwithstanding the existence of pyæmia, is supported by the observation of Schwartze, that when an early diagnosis is made, and when favorable anatomical conditions exist, operative interference in purulent thrombosis of the lateral sinus would yield more favorable results than the treatment with cinchona and wine hitherto employed. In support of this view Orlow[1] also opened the mastoid process in a case similar to mine. In this case, Orlow believed the opened abscess to be connected with a purulently degenerated thrombus and that the cavity of the cranium had been opened during the operation; he believed this on account of the character of the pus and the position and form of the abscess.

Finally, I wish to add that it was not possible to decide whether the purulent affection of the middle ear was acute, as in the three previous cases described by me, or whether it was an acute exacerbation in the chronic process of longer duration. In support of the former view there was the previous history as well as the fact that Bezold's form of mastoiditis usually occurs in recent cases; the objective sign added weight to the latter view.

When about to publish this short observation, I read a very deserving paper by the esteemed surgeon Professor Edm. Rose, director of the surgical station in Bethanien: "Ueber die Heilbarkeit der Pyæmie," a paper read in the Congress of Surgeons in Berlin and accompanied by presentation of a case of cure; it was published in No. 24 of the *Deutsch. med. Wochenschr.*

In this paper Rose describes the thoughts which led him to operate in cases in which pyæmia was already present. Of the generally known monograph of Robert Koch which appeared in 1878, and which elevated the treatment of wounds to the height of natural science, Rose says, he was

[1] Ueber Trepanation des Schläfenbeins bei Thrombose des Sinus transversus. *Deutsch. med. Wochenschr.*, 1889, No. 10.

interested, among other things, in pyæmia, which had been successfully reproduced in squirrels:

"A certain number of pyæmia-cocci is necessary to convey the disease; a smaller number will be tolerated. The animal will overcome a small quantity of cocci in the blood in cases of pyæmia—hence this also applies to man!

"Koch's results led me to reconsider the active therapy of pyæmia in the light of his observations. I destroy every pyæmic focus just as though it did not exist, but according to all rules of art, as rapidly as possible by irrigation with antiseptics and the use of the very strongest reagents. Corresponding to the observations of Robert Koch, an attempt is made in this manner not only to destroy the various deposits of cocci as far as possible in every case, but also to keep the quantity of cocci in the blood down to the minimum—a quantity compatible with life, until the body has overcome them by the aid of our antiseptics.

"I was struck by the increased frequency of cases of cured pyæmia as a result of this active interference.

"Pyæmia is no longer an excuse with me for doing nothing, but rather a reason for doing the necessary operations rapidly and thoroughly, fully conscious of the unfavorable course which I may not be able to influence, but supported by the experience that with the present active treatment of pyæmia more patients recover at least than formerly."

The consequences of these remarks when applied to the subject under consideration, are evident.

MICRO-ORGANISMS IN ACUTE MIDDLE-EAR SUPPURATION.[1]

By A. SCHEIBE, Munich.

Translated by Dr. J. A. Spalding, Portland, Me.

KIRCHNER showed two years or so ago[2] that the staphylococcus pyogenes albus was one of the causes of furunculosis in the external meatus, and Loewenberg has since claimed [3] the same action for the staphy. pyog. aureus and citreus, but the question, what micro-organisms cause otitis media purulenta—with exception of the tubercular form—still remained unanswered. Bacteriological investigations had indeed been made from this point of view, but the purulent matter had always been examined after the perforation of the *Mt*, not before. For this reason it seemed sufficiently important to test the contents of the tympanum before the perforation of the *Mt*, and thus be able the better to define the secondary suppuration coming either from the meatus or the tubes. It was only after my investigations were well under way, that I heard of those already undertaken by Netter[4], Zaufal[5], and Weichselbaum,[6] to test by cultivations the secretion of the tympanum before the perforation of the *Mt*, Zaufal in the living, the others in the cadaver.

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[1] From the German edition, vol. xix., p. 293, 1889.
[2] *Monatssch. f. Ohrenhlkde.*, 1887, No. 1.
[3] *Monatssch. f. Ohrenhlkde.*, 1887, No. 11, and *Zeitsch. f. Ohrenhlkde.*, vol. x., 1881.
[4] *Arch. gén. de Médecine*, 1887, p 451.
[5] *Prager med. Wochensch.*, 1887, No. 27.
[6] *Monatssch. f. Ohrenhlkde.*, 1888, Nos. 8 and 9.

I have also examined bacteriologically some *cases of tubal affections with collection of serum* in the middle ear. But I will first give a résumé of the papers that have hitherto appeared on this topic.

Loewenberg was, as we have just seen, the first to examine middle-ear suppuration bacteriologically. Microscopically and in cultivations he found micrococci, and with fœtid suppuration enormous colonies and rod bacteria. Once he found a bacterium capitatum in the meatus, and bacilli alone in two peri-auricular abscesses with odorless pus. He seems to have regarded the bacilli and cocci as mere concomitants of the middle-ear suppuration.

Kessel[1] cultivated cocci, bacteria, and saprogenic bacilli from the otorrhœal secretion.

Dunin[2] observed staphylococci and streptococci microscopically in two cases of bilateral otitis media purulenta in typhus.

Fraenkel and Simmonds[3] cultivated the staphylococcus pyogen. aur., from the aural secretion of a typhus patient.

Netter found[4] by inoculation pneumococci, and later by cultivation[5] in a patient dead from pneumonia, the same, which he calls Fraenkel's pneumococci. *This is the first case of middle-ear suppuration examined, in which the Mt was not perforated.*

In the paper already mentioned, he communicates eleven cases, partly with fœtid secretion, nine of them strept. pyog., and two the diplococcus Fraenkel; of the nine, four were pure cultivations, and of the two, one was a pure cultivation. The staph. pyogen. aureus was present with rods in a few cases. Three of the nine strept. cases were fatal, and in two others a mastoid abscess developed. The strept. was also observed as a pure cultivation in the complications.

Holst is reported to have seen the streptococ. pyogen. as a pure cultivation.[6]

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[1] *Oest. Aertz. Vereinszeitung*, 1885, No. 5.
[2] *Deuts. Arch. f. klin. Med.*, 1886, Heft iii., p. 373.
[3] *Zeitsch. f. Hygiene*, 1887, Band ii., p. 143.
[4] *Arch. gén. de Médecine*, 1887, 451.
[5] *Annales des Maladies de l'Oreille*, 1888, p. 514.
[6] *Norsk. Magazin*, 1888, Maerz–April.

Zaufal was the first to examine on the living the secretion *directly after paracentesis of the Mt.* The first case, which became complicated with facial paralysis, revealed in the serous secretion of the ear and nose *Friedlaender's pneumonia bacillus* on stripe cultivations, and the second in agar stripe cultivations a micro-organism which could be nothing else than the *diploc. pneumoniæ.*

Zaufal later examined[1] twelve cases of otitis purulenta after the rupture of the *Mt*, and found in four the diploc. Fraenkel, once in a mastoid abscess as a pure cultivation. He discovered the strept. pyogen. five times. They were present in four cases complicated with mastoid abscess. The staph. pyogen. aur. was found twice, and the microc-tetragenus Gaffky once, as a pure cultivation in the secretion of chronic otitis purulenta with abscess of the mastoid and unhealthy state of the parts. A phlegmon, originating from a mastoid fistula, later revealed as a pure cultivation the stept. pyogen.

Zaufal was also the first to excite otitis purulenta by inoculation with pure cultivations; he did this once in a rabbit with the diploc. Fraenkel, and once with Friedlaender's bacillus. He mentions that Wagner had found pyogenic micro-organisms in otitis media acuta, but he has not yet published his results.

Rohrer[2] cultivated staph. pyogen. albus, and small bacilli from the secretion of five patients with acute and chronic middle-ear suppuration and caries.

Bezold[3] examined, microscopically and by cultivation, the secretion of one hundred middle-ear suppuration cases, with especial reference to the morphology of the microorganisms, and found diplococci, monococci, staphylococci, streptococci, and beside these, in the acute and chronic types *when fœtid*, eight forms of bacteria which were not pathogenetic. The virulence was tested by injections into the tympanum.

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[1] *Prager med. Wochensch*, 1888, Nos. 8, 20, 21, and 45.
[2] Naturforsch. Vers. zu Wiesbaden, 1887.
[3] Naturforsch. Vers. zu Coeln, 1888, and Rohrer, *Deutsch. med. Wochensch.*, 1888, No. 44.

Rohrer found nothing but cocci in the non-fœtid cases.

Weichselbaum discovered in a fatal case of otitis purulenta[1] Friedlaender's pneumonia bacillus, which he thinks excited the disease, and cocci, which he thinks only accidentally associated, since they belonged neither to the strept. pyogen., nor to the staph. pyogen. albus or aureus, nor to the diplococcus pneumoniæ. He also found it in complications of this disease and in the lungs as a pure cultivation. *Mtt* sections revealed it within the blood-vessels and in cellular infiltration. He also remarks that the diplococcus pneumoniæ was present in five cases of middle-ear suppuration *without perforation of the Mt*, and that he examined them microscopically and cultivated them.[2] These too were examined after death. As his later publications show, other non-pathogenic micro-organisms were present in three cases in addition to the diploc. pneumon., and the staph. pyogen. aureus. Weichselbaum explains this by the long interval between the death and the autopsy.

The strept. pyogen. was discovered in a seventh case, in which the secretion was taken from the living.

Moos examined three cases of middle-ear suppuration with the microscope,[3] and found in a secondary abscess cocci, which he regarded as pus streptococci and Fraenkel's diplococci. The same was discovered in a mastoid abscess, after an acute otitis media purulenta, in the secretion of which streptococci had previously been discovered. He found only streptococci in the cholesteatomatous masses of a fatal otitis media purulenta.

There were also cases of blue pus and aphthæ.

Stein found, in a case of Zaufal's,[4] bacilli in blue pus resembling the bacterium termo.

Weichselbaum cultivated, from the green pus of a case of chronic otitis purulenta of Gruber's,[5] the bacillus pyocyaneus. Its appearance as well as its transmission to other persons was generally associated with increased inflammation.

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[1] *Monatsbl. f. Ohrenhlkde.*, 1888, Nos. 8 and 9.
[2] *Wiener klin. Wochensch.*, 1888, Nos. 28-32.
[3] *Deutsche med. Wochensch.*, 1888, No. 44.
[4] *Arch. f. Ohrenhlkde.*, Bd. vi., p 206.
[5] *Monatssch. f. Ohrenhlkde.*, 1887, No. 6.

Valentin [1] discovered in the mouth, naso-pharynx, meatus, and middle ear of a young girl a variety of aphthæ resembling the oidium form.

I come now to my investigations. Eleven were cases of otitis media acuta before the rupture of the *Mt*, and two were after the rupture, not especially selected, and four cases were of tubal affection with accumulation of serum.

Case 1.—Mr. A., aged twenty, acute tubal catarrh with *Mtt* atrophic.

Otorrhœa, right.

Three days later: fulness and deafness; posterior half of *Mt* with two blisters, the lower one bulging and yellowish; no pain; hearing: whispered voice 1½ *m*.

Paracentesis, left, evacuates a large amount of pus. (I would note here that in my investigations I always used the first pus that escaped from the paracentesis, and if the operation was repeated, I always used what came out fresh).

Microscopic examination revealed staph. pyogen. tenuis.

Case 2.—Mr. J., aged thirty-nine, acute catarrh, pain in right ear; mastoid tender; paracentesis; staphylococcus pyogenes tenuis.

Case 3.—K. W., aged six; otitis media purulenta, right; paracentesis; stapyloc. pyogen. albus.

Case 4.—Mrs. W., aged twenty-seven, ceruminous plug; after removal, *Mt* looks swollen; paracentesis; abundant pus; no perforation whistle; but the pus rapidly follows Politzerization; otitis media suppurativa; pharyngitis luica; staph. pyogen. albus.

Case 5.—Repeated attacks of acute otitis media purulenta; paracentesis; polypoid granulations snared off; streptococcus pyogenes, and stapylococcus pyogenes albus.

Case 6.—Mrs. R., aged thirty-six, deafness, catarrh, and pain in left ear for six days; whispered voice: right normal, left twelve *cm*; catheterization with bubbling noise; increases hearing to 1 *m* for whisper; tuning-fork "*a*" from vertex in left (diseased) ear.

A week later: diffuse injection of the entire *Mt*; yellowish prominence behind the umbo; paracentesis liberates an opaque serum; streptococcus pyogenes.

[1] *Arch. f. Ohrenhlkde.*, Bd. xxvi., p. 81.

CASE 7.—Mr. P. aged thirty ; otitis acuta ; posterior half of *Mt* prominent, yellowish ; paracentesis ; Politzerization, and escape of abundant pus.

A fortnight later: a granulation in the perforation ; snared swelling over mastoid process ; abundant secretion of thick pus ; *Mt* permeable for air ; great tenderness over mastoid ; ice-bag ; mastoid better ; the microscope revealed the diplococcus pneumoniæ (Fraenkel).

CASE 8.—F. O., aged nine, recurring deafness ; lately pain in ear ; after Politzerization, yellowish, bulging spot on *Mt ;* paracentesis ; slimy secretion ; epidermic masses in meatus and on *Mt ;* no pain after paracentesis ; secretion soon ceased ; streptococcus pyogenes.

CASE 9.—Mr. W., aged forty-seven ; paracentesis for pain in left ear ; much pus evacuated ; streptococcus pyogenes. The microscope also exhibited capsule cocci that bore a great resemblance to the pneumococci of Fraenkel.

CASE 10.—Mr. M., aged thirty-eight ; diffuse myringitis ; no perforation whistle ; paracentesis ; pus ; microscope : yellow bacillus, not liquefying, and cocci, single and double and in rows up to five.

CASE 11.—Mr. J., aged fifty-nine ; otitis media purulenta, left ; bacillus tenuis ; cocci single and double and in rows up to four.

We next have two cases with perforation of the Mt before paracentesis was made.

CASE 12.—Miss M., aged twenty-two ; otitis media acuta purulenta, right ; streptococcus pyogenes.

CASE 13.—Miss M., aged thirty-nine ; four weeks of otitis media purulenta ; streptococcus pyogenes.

Next we shall mention four cases of tubal affection with collection of serum, the first one being of great interest on account of occlusion of both pharyngeal tubal orifices.

CASE 14.—Mr. C., aged thirty-three ; total loss of velum ; repeated paracentesis, once with the galvano-cautery; only one evacuation of thick, amber-yellow fluid ; generally nothing but serum from the tympanum ; hearing at first 20 *cm* for whispered voice, later 1½ *m ;* obliteration of both pharyngeal tubal openings ; *no growth visible on the gelatine plate, either with eye or microscope.*

CASE 15.—C., aged nineteen; remains of otitis media purulenta with cicatrized perforation; *horizontal paracentesis through the cicatrix and the adjacent portions of the drum-head so that the incision gapes;* no fluid; tympanum apparently empty; a glass tube, however, withdraws by suction considerable clear, pale-yellow serum; no cultivation could he obtained on gelatine plates.

CASE 16.—Mr. K., aged thirty-three; tinnitus, and inflammation in left ear three weeks; paracentesis; clear amber-yellow serum; no growth on agar plates.

CASE 17.—Mrs. F., aged twenty-two; hearing: left, 50 *cm;* after catheterization, 3 *m.* A week later hearing worse; always better for a while after Politzeration; finally paracentesis; light yellow serum evacuated; tubal catarrh with serum accumulation, left; *no cultivations visible on agar plates, either macro- or microscopically.*

Bacteriological Portion.

The secretion used in my investigations came in every case from the paracentesis. After the canal had been forcibly syringed with a 5 % solution of carbolic acid, which in most of the cases was left in the canal some time, it was dried out with sterilized absorbent cotton. Then the needle, after a cleansing in the same carbolic solution, was pushed through the *Mt.* If no secretion followed the paracentesis, Politzerization was employed. The secretion was then taken up on a probe with sterilized cotton and the end cut off with sterilized scissors and then passed into a gelatine test tube. Most of the specimens were placed in sterilized glass tubes drawn out to a point and then melted, whilst the other end was plugged with a wad of absorbent cotton. The long drawn end was broken off with hot tongs, and the other then furnished with a rubber tube by means of which the secretion could be sucked up and then again blown into a gelatine glass. Furthermore, cover glass preparations were made, and stained with aniline water, gelatine-violet or potass.-methyl blue, and also partly after Gram's method. The secretion that had been passed into the gelatine glass was generally poured on the same day upon gelatine plates [1] and also occasionally upon agar plates.

[1] The bouillon-pepton gelatine contained in winter 8 %, in summer 10 %, gelatine; the glycerine-agar 1 % agar-agar, and 6 % glycerine.

Most of the plates could be arranged on the next day, but up to that time the test tubes were placed in an ice-chest in order to restrain the growth as much as possible. The agar plates placed in the thermostat[1] were generally inoculated under the microscope in from three to five days, the gelatine plates in from eight to fourteen days, if different varieties were present, into different glasses. Secondary plates were used in order to see if the cultivations from the first were pure. This was not done in a few cases in which streptococci were found. Nevertheless the presence of other micro-organisms can certainly be excluded in gelatine puncture cultivations, which exhibit the typical growth of streptococci and contain microscopically nothing but streptococci. The micro-organisms discovered in a few cases were up to the end of my work cultivated for several generations.

Seven varieties of micro-organisms were thus cultivated in thirteen cases of acute inflammation of the middle ear. In thirteen others the secretion of acute otitis media purulenta without perforation was examined fruitlessly; either the gelatine stripes remained sterile or the condensation water gathered on the agar stripes.

Carbolic acid is at fault in these cases of sterility, I think, for some of the successful cases showed a weakening of the cocci, a circumstance that could be referred to no other cause than this alone. I also noticed that both streptococci and staphylococci were often discovered only upon the agar plates and only under the most favorable conditions of bodily temperature, and not at all upon the gelatine plates. The former could, however, then be transmitted in both sorts as well on gelatine-puncture cultivations as on secondary gelatine plates. They remained, though with occasional intermission, transmissible to the last.

For these reasons I took greater care in drying the latter half of the preparations, and as a result the cocci made their appearance upon the primary gelatine plates.

The same sterility was observed in six paracentesized cases of Zaufal's and probably owing to the very same causation.

[1] The reagent plates with agar and bouillon were invariably placed in the thermostat.

The staphylococcus pyogenes tenuis was twice discovered. These cocci in pure cultivations are generally much larger than the staph. pyogen. albus or aureus. Their form is often irregular; occasionally one diameter is larger than the other; the size and grouping often varies with the nourishing soil. In bouillon, for instance, they are generally scattered, or they lie in minute clusters, or in rows of from three to six, whilst in agar and gelatine they are generally in large and beautiful clusters with their parts closely united. When stained by Gram's method they remain tinted. *Gelatine is never liquefied.* On *gelatine plates* they grow macroscopically in the shape of dots and whitish deposits, but under the microscope (seventy-one diameters) they appear as roundish, finely granulated, light brown colonies with sharply defined borders like the streptococci to which in their growth they have the greatest resemblance. In the *gelatine puncture cultivations* they form close to the puncture a very delicate glassy and shiny deposit. In the puncture itself they grow like the streptococci, only, it seems, much more luxuriantly. They grow as well in acid as in strongly alkaline gelatine, which is not the case with the strept. pyogen., which, for the sake of comparison, was inoculated into the same nutrient material. *In agar puncture cultivations* we occasionally observe near the puncture a very delicate finely punctated and slightly transparent halo, which in one case was rather thicker than usual and grayish-white at the margin. Its growth in the puncture does not vary greatly from that of the streptococci, and it forms upon gelatine and agar alike a delicate deposit, which is granular toward the margin and transmits the color of the nutrient material. A cultivation more than three months old was transmissible from agar to agar. Unfortunately I did not make *any animal experiments* in the beginning, but six months later and with the necessary precautions, $1\frac{1}{2}$ *ccm* of bouillon culture three days old was injected hypodermatically into a white mouse, which on the next day appeared quite ill, but soon recovered without exhibiting local symptoms of any sort. In another case the same negative result was obtained from a cultivation two days

old, but whose primary culture was at least six months old. It is impossible to prove from these experiments with such old cultivations, whether the staphylococcus pyogenes tenuis is pathogenic or not. Thus, again, B. Winter[1] could not obtain any results in animals with the genuine cultivation of a staphylococcus which previously was pathogenetic. The same is true with reference to the pus staphylococci of Baumgarten.[2] It is also possible that the same is the case with the staph. pyogen. tenuis.

The staphylococcus pyogenes albus was discovered three times, once with the streptococcus pyogenes, also once as a pure cultivation in otitis externa crouposa. It was also seen in pus in one case, in which it sprouted upon the agar stripe, as a pure cultivation, single, two by two, and in rows up to seven, rarely loosely in heaps of four together. I did not observe any larger clusters. This staphylococcus in pure cultivations forms beautiful bunches. It is not discolored by Gram's method. Gelatine is invariably liquefied. In the gelatine puncture cultivations it forms upon the funnel-shaped liquefied gelatine, which is but slightly granular and diffuse, very thin whitish deposits. At the bottom lies a whitish-gray to grayish-yellow sediment. The rest of the inoculation puncture is not characteristic. *In agar puncture cultivations* it forms upon the surface a whitish-gray and rather thick and moistly glittering deposit. The puncture itself is not characteristic. *On gelatine plates*, macroscopically, the superficial colonies appear whitish-gray, as large as the head of a pin, surrounded by a deep, sharply defined valley; the deeper-lying ones appear yellowish in tint. Under the microscope the smaller ones appear as roundish, finely granular, smooth-edged, and brownish; the larger ones, as slightly jagged, dark-brown greenish colonies. In this case, too, the hypodermic injection into a white mouse of a 1½ *ccm* of a bouillon cultivation, the primary cultivation being five months old, resulted negatively. I did not make any further experiments since I saw in advance from the previous experiments that the virulence was entirely exhausted,

[1] *Zeitsch. f. Geburtsh. und Gynaek.*, 1888, Bd. xiv.
[2] Lehrbuch d. pathol. Mykologie, p. 418.

assuming, of course, that it had ever been present at all. Nevertheless I regard the staphylococci just described as identical with the staphylococcus pyogenes, because the morphology of the two is identical, they coincide in their development, and were twice discovered in pus as a pure cultivation.

The streptococcus pyogenes was four times found as a pure culture, and once in connection with the staph. pyogen. albus and the diplococcus pneumoniæ.

It has been asserted by Fluegge,[1] Fraenkel,[2] and Baumgarten [3] that the form of the single cocci—or, that is to say, of the similarly growing erysipelas streptococci — is ninepin shaped, but Passet says [4] that in older cultures the cocci often increase in length and in breadth.

I found the pus streptococci not only in pus but in the fresh cultivations occasionally enlarged in one diameter, more often in breadth than in length.

Whilst in the pus they were more frequently arranged into diplococci, or even into shorter rows, and very rarely, on the contrary, into greater chains, they lay in the pure cultivations in rather elongated and very sharply curved chains. It was only in one case that we saw the chain formation combined with clusters, a manner that has been noticed by other observers. This was most distinctly visible in gelatine, less distinct in agar, whilst in bouillon only large chains were present. And yet it was generally easy to see that the clusters were composed of single chains. They remain stained after Gram's method. *Gelatine is not liquefied.*

The gelatine plates exhibit to the naked eye punctated and whitish colonies, whilst under the microscope they are completely round, finely granulated, and brownish-yellow. In the gelatine puncture cultivation we see close to the puncture a delicate deposit, as in the case of the staph. pyogen. tenuis. The puncture is pale yellow by reflected, whiter by transmitted light, throughout fine, rather coarsely

[1] Lehrbuch, p. 149.
[2] Lehrbuch, p. 311.
[3] Lehrbuch, p. 224.
[4] Untersuchungen ueber die eitrige Phlegmone des Menschen. Berlin, 1885, p. 34.

granular toward the end, and, on the whole, not particularly characteristic.

In the agar puncture cultivation it grows alone in the puncture, and there is no superficial halo as in the staph. pyogen. tenuis.

Although I had fresh cultivations at my command the pathogeneity was only tested in mice, since there does not seem to be any constant difference between the streptococc. pyogen. and erysipelatos.

Seven white mice were hypodermatically injected with from 0.3 to 1½ *ccm* of bouillon cultivation from various cases, the primary cultivation being from one day to four weeks old. Four of them died. There was no local suppuration, and but slight œdema; only once an extensive hemorrhage beneath the skin. In the spots where the needle had been introduced, as well as in the blood in the heart and in the spleen of the four mice, the strept. pyogen. appeared in pure cultures.

Then we ask if this is the streptococc. pyogen. or the strept. erysipel. Inasmuch as no differences have ever been discovered between them, either by cultivation or by tests on animals, Baumgarten regards them as identical, but this cannot yet be decided positively one way or the other; nevertheless, the fact that the latter has been discovered in the purulent secretion of middle-ear inflammation which had no connection with erysipelas, testifies with a great degree of probability that the streptoc. erysipelat. is one and the same with strept. pyogen.

Dipplococcus Pneumoniæ.

BACILLUS TENUIS.

This is the name I should like to give to a bacillus from its resemblance to the staph. pyogen. tenuis, which was just once discovered upon the agar plates. It forms in pure cultivations in gelatine and agar feeble little rods, like the hog's erysipelas bacillus, which like to cluster together. Its form is entirely different in a pure cultivation in bouillon.

Standing in thickness between the anthrax bacillus and

the bacillus of malignant œdema, they are about three times as long as they are thick. Their form in pus resembles that in bouillon. *They do not move*, and remain stained after Gram's method. *Gelatine is not liquefied.*

On gelatine plates they form very small, microscopic roundish and oval, very finely granular, clear-brown, shining colonies with a well defined border.

Directly around the puncture in the gelatine puncture cultivations we observe an extremely delicate brilliant deposit, and in the puncture itself it grows just like the staph. pyogen. tenuis, or streptococcus, only it occasionally forms, by the transfer of considerable material, a delicate, homogeneous band, which I have not observed in the other two.

There is no superficial halo in the agar puncture cultivations, as is often the case with the staph. pyogen. ten., and in the puncture it grows precisely like the former, though not characteristically.

I failed to discover any growth of this species *upon potatoes.*

I experimented also with this bacillus on a white mouse with a four days' old bouillon cultivation, with a primary cultivation of about two months, but the mouse was still alive ten days later. Then it was killed, but there was no trace, with the eye or microscope, at the puncture, of any micro-organisms. Its pathogeny, if it has any, must be later demonstrated. Eisenberg does not mention any bacillus that in the least resembles this.

A yellow, non-liquefying bacillus was once discovered in company with a gray non-liquifying bacillus.

The pus often contained short, thick rods, occasionally curved, the pure cultivation shorter and longer, and sausage-shaped rods, as thick as a xerosis bacillus, and mostly in rows of two to four. One or both ends were often club-shaped. They do not move, and remain stained after Gram's method.

Gelatine is not liquefied.

The gelatine plates exhibit, deep down, small yellowish, and superficially, intense yellow button-shaped colonies; microscopically, they are all quite round, the lowermost

a brownish-yellow, finely granulated, with a rather smooth, somewhat brighter border, the superficial ones granulated only at the border, and darker with a tint of greenish.

The gelatine puncture cultivation develops in the centre a superficial circular excavation from which radiating segments depart, occasionally dividing again as they proceed outward. This development is circumscribed, does not reach the margin of the glass, and is straw-colored with a circular white shading in the centre. We occasionally observe a furrow with sulphur-yellowish pigment at the beginning of the puncture, but the puncture itself offers nothing characteristic.

The agar cultivation shows a superficial yellowish deposit much like that in staph. pyogen. aureus, but the puncture is not characteristic.

Potatoes show a slight discontinuous and sulphur-yellow deposit.

The gray, non-liquefying bacillus was discovered in one case in conjunction with the bacillus just described, and only separated by a secondary plate.

In form, and size, and in the shape of its colonies it is just like this other bacillus, only it is apparently white to the naked eye, though microscopically more gray than brown. It is also immovable, and does not bleach out after Gram's method.

Gelatine is not liquefied.

The gelatine puncture cultivation shows a superficial, thin, diffuse, irregular, light-gray deposit, that does not reach the edge of the glass, but the puncture is not characteristic.

The gelatine in older cultivations sinks somewhat in the region of the deposits.

The agar puncture cultivation has a superficial, diffuse, grayish-white, shiny deposit, but the puncture is not characteristic.

Potatoes develop a continuous, bright gray deposit broader than in the case of the yellow bacillus.

One and a half *ccm* of a two-day-old secondary bouillon culture was injected into a white mouse, but did no harm. Therefore its pathogenic qualities are still in doubt.

All three sorts of rods were propagable from gelatine to gelatine after more than three months.

Examinations in eleven cases of otitis media purulenta where no perforation of the Mt could be perceived, revealed twice the strept. pyogen., twice the staph. pyogen. albus, twice the staph. pyogen. tenuis, once the diplococcus pneumoniæ, once the strept. pyogen. with the staph. pyogen. albus., and once with the diploc. pneumon. (*the latter only with the microscope*), *and twice rods* (*with cocci microscopically*). *Two cases of otitis with perforation revealed the strept. pyog.*

I would here emphasize the fact, *that the staphylococcus pyog. aureus could not anywhere be discovered*, and yet I look upon this as the less essential since it was grown by Zaufal as a pure cultivation from middle-ear pus.

The next question is, whether the pus cocci (counting in this list the staph. pyogen. tenuis, and leaving aside the rods and the diploc. pneum.) excited the otitis media in these cases. Zaufal makes the answer to the question depend upon three points: What micro-organisms does the secretion of a middle-ear suppuration contain? Can these be discovered in the tissue of the inflamed mucous membrane; and can we succeed with the same in inoculating otitis media upon other individuals? Now since of these three questions only the first has been examined, the original question at the head of this paragraph cannot be precisely answered, yet the theory that these cocci actually excited the otitis media seems very probable, because in the first place they have been discovered in inflammations which have not been in communication with the air by means of a perforation in the *Mt*, and more than that in every case as a pure cultivation; secondly, because the strept. pyogen. albus has been discovered by other observers as a cultivation; and thirdly, because there is no reason why the pus cocci, the exciters of various other forms of inflammation, may not produce the same in the mucous membrane of the tympanum. And all the more since the pus cocci are widely distributed and have not only been discovered in the pathological, but as well in the normal mucous membrane of the mouth, nose, and naso-pharynx, and even

indeed in the tube[1] from whence their path to the inner ear is always open. Biondi,[2] too, has cultivated from the saliva, a coccus that bears great resemblance to the staph. pyogen. tenuis, especially when cultivated on gelatine.

Two cases deserve especial mention, because only rods could be obtained from them. But I have already mentioned that pus often exhibited microscopically roundish cocci that were not discoverable in subsequent cultivations. We cannot tell precisely what sort of cocci these were, but we have a right to think that they excited the suppuration, whilst the rods were simultaneously and accidentally wafted with them into the middle ear and are to be regarded as nothing but trifling adjuncts. And after all, considering the extreme difficulty of excluding a previous rupture of the *Mt*, it is additionally possible that they reached the tympanum through the external meatus. It therefore seems, *that rods may be discovered in the secretion of acute suppuration of the middle ear even before the rupture of the Mt.* Rohrer has examined the pus in thirty-two cases of inodorous aural discharges, and never discovered any thing but cocci. Our two cases prove that *rods also may be present in inodorous secretions*, as Loewenberg and Netter have also observed.

The question *whether, and if so, how the various pus cocci differ in their influence upon the course of the suppuration* is limited by the circumstance that the number of cases examined is so far too small for basing any opinion. The course in the only reliable case in which the staph. pyog. albus appeared as a pure cultivation seemed milder so far as the symptoms and the duration were concerned. The two cases with the staph. pyog. tenuis were also of short duration, and in only one of them was there pain, though that was more severe than usual.

Zaufal was the first to assert that the *strep. pyog., owing to the peculiarities which especially suit it for that noxious influence, plays an important rôle in the grave complications resulting from chronic otitis.* Moos and Netter support this view by their observations, and my own experiments ap-

[1] De Rossi, Internat. Med. Cong., Washington, 1887.
[2] *Zeitsch. f. Hygiene*, 1887, Bd. II.

parently speak in its favor. *For in four of the six cases of strept. pyogen. the mastoid was affected.* Additionally it must however be mentioned *that the otitis purulenta may progress very mildly in spite of the strept. pyogen.*, as Case 8 shows, and additionally that other micro-organisms may excite the complications, as Weichselbaum and Zaufal have shown; *e.g.*, Friedlaender's bacillus and Fraenkel's diplococcus and the pure cultivations of micrococcus tetragenus in a mastoid abscess.

Case 7 with the diploc. pneumoniæ, showed swelling and sensitiveness over the mastoid.

It may be interesting to note, that the cases of strept. pyogen. never revealed maceration of epidermis in the meatus or on the *Mt* on the day when the paracentesis was performed. In Case 9, the light-spot did not disappear during the entire course of the suppuration. It is further remarkable, that in some of the cases the suppuration had lasted for a fortnight or three weeks without perforation of the *Mt.* Perhaps this may be due to the circumstance that the strept. pyogen. has but little inclination to break down the tissues. But two of Zaufal's cases in which the pain and the discharge were coincident prove the contrary, for the strept. pyogen. alone was demonstrated later.

Netter found the strept. pyogen. in both ears in five cases out of nine. I found none with the strept. pyogen. in both ears, and only one each with the staph. pyogen. tenuis and albus in both ears.

Another question is, *whether we can conclude any thing in regard to the cocci in any other way than by cultivation. The nature of the secretion does not seem to offer any key to this question.* For the sero-purulent secretion contained both the staph. pyog. ten. and the strept. pyogen., the mucous and muco-purulent secretion the staph. pyog. tenuis, the staph. albus, and the strept. pyogen., and the purely purulent secretion contained the staph. albus, once alone, and once with the streptococcus. Assuming that in the last case the staph. pyog. albus. determines the nature of the secretion, we might imagine that its presence depended entirely on the pure purulent secretion, but Zaufal's obser-

vation of streptococci in purulent secretions negatives this supposition.

Nor does the microscope alone suffice to give a clue to the pus cocci contained in the secretions. Several times the microscopic appearances in pus were precisely the same with strept. as with the staphylococci. To be sure it seems as if we might diagnosticate streptococci from the grouping in *larger* chains, since the strept. cluster together, but on the contrary staphylococci cannot arrange themselves in *greater* rows. Even then, the single or double cocci close to the chains, do not give us any definite clue as to whether we have a pure culture, because the strept. as well as the staph. are occasionally seen grouped in no other order than two by two. This was particularly noticeable so far as the strept. were concerned. This phenomenon cannot depend alone upon the duration of the inflammation, because Zaufal saw chains of twelve links in a specimen only four days old, whilst in ours (Case 13), four weeks old, only cocci singly and in pairs could be discovered. Furthermore, this rudimentary grouping is habitual in the bodies of animals, as has also been noticed by other observers.

When we investigate the question *whether any other micro-organisms than the pus cocci can excite middle-ear suppuration, we can leave aside the microc. tetragenus., Valentine's oidium albicans, the bacillus pyocyaneus, and the other rods that have not yet been more clearly described.* Hence we have left only the diploc. Fraenkel, and the bacillus Friedlaender. The former was discovered five times before the perforation, the latter but once, and only then as a pure cultivation upon a gelatine stripe. Inasmuch as they are found in the mouth and nostrils, as their virulence toward mankind seems proved, and as Zaufal has been able with their assistance to excite otitis media in animals, there can be no doubt, *that they can equally excite the same in man.*

The *collection of serum in tubal affections has generally been regarded as a purely physical process of transudation,* and the microscopic condition agrees with this theory. We find a few scattered white and red blood corpuscles, the latter

probably giving to the serum its amber-yellow color. The bacteriological condition coincides with the explanation that no inflammation is present during this process.[1] Not a trace of any sort of growth could be discovered upon agar plates in two cases, or upon gelatine plates in two cases. For this reason the cases of accumulation of serum in tubal affections ought to be more carefully separated from the catarrhal inflammations of the middle ear than has hitherto been done. The fact that the former can easily pass over into the latter may be explained by the fact, that a germ which might not be capable of exciting inflammation in the healthy mucous membrane finds in the serum an excellent nutriment, flourishes abundantly within it, and after a while begins to act irritatingly upon the mucous membrane, as seems to have happened in Cases 1 and 8.

[1] The single case of stenosis of the tubes offered a mucous secretion after paracentesis, but as we cannot believe that a mucous secretion of the middle ear mucous membrane can occur without micro-organisms, we can only suggest that these micro-organisms arose from the previous paracentesis.

OTOLOGICAL NOTES COLLECTED IN THE SOCIETIES AND JOURNALS OF GREAT BRITAIN.

Society and Other Meetings—Hawaiian Society.—At the meeting held on January 2d, an important paper was read by Dr. Hill upon "Aural Complications in Acute Specific Fevers." Dr. Hill maintains that, excluding what he terms "post-exanthematous" adenoids, upwards of fifty per cent. of chronic ear cases in early life are due to this cause, but that in the majority of instances this complication can be readily prevented or cured if detected early and treated promptly. In scarlet fever, variola, and diphtheria, Dr. Hill believes that acute suppuration of the middle ear is usually the primary mischief, while in cerebro-spinal fever, mumps (occasionally), and typhus, the labyrinth is primarily involved.

At the meeting, held on March 20th, Dr. Savage read a paper upon "The Warnings of General Paralysis of the Insane," in the course of which occurs the remark, "affections of hearing, too, are far more common than I expected among the warnings of general paralysis."

Medical Society of London.—At the meeting held on March 31st, Mr. Ballance reported a series of four cases in which he had operated for "septic thrombosis of the lateral sinus, consecutive to aural disease." In these cases the internal jugular vein was tied and cut in the neck, the sinus opened up longitudinally, and the offensive clots syringed out. Of these four cases, two subsequently died.

Clinical Society of London.—At the meeting held on May 9th, Dr. Sainsbury and Battle read a paper upon "Cerebral Symptoms Accompanying Disease of the Middle Ear; Operation on the Ear; Cessation of Symptoms." The operation performed

consisted simply in the removal of portions of diseased bone from the ear, and the paper illustrated, in a very decided manner, the importance of ascertaining if possible the exact source of irritation, and of removing it before proceeding to the more serious operation of trephining the skull.

Royal Academy of Medicine in Ireland.—At a meeting held on February 7th, the President, Dr. A. W. Foot, read a paper "On the Medical Selection of Lives for Assurance," and drew attention, among other anomalies, to the fact that but little, if any, attention is paid to the significance of aural discharges. It is, of course, for the offices to decide how far they would be justified in imposing new restrictions, but there can at any rate be but little doubt that chronic ear disease is a very prominent factor in the determination of "length of life."

Royal College of Physicians.—For the Gulstonian lectures, Dr. Newton Pitt has chosen as his subject "Some Cerebral Lesions," and in his first lecture gives an analysis of fifty-seven cases of ear disease, and of the complications which led to death. The subject is of course highly interesting to the otologist, and we hope to be able to secure a full report or ample abstract of the lectures when the series is completed. It may be remembered that Dr. Otto Horner of Frankfort, has collected and published statistics of thirty-one cases of a similar kind, and the comparison of these with the fifty-seven analysed by Dr. Pitt, cannot but afford valuable information.

The Influenza Epidemic and Ear Disease.—Not the least remarkable of the many curious phenomena observed in connection with the recent epidemic is its association with various aural lesions. If the constitutional disturbance were invariably accompanied by severe naso-pharyngeal catarrh, the association in question would not be so surprising; but this catarrh would almost appear to be the exception rather than the rule; nor does it appear to have been a marked symptom even in those cases that have come under the care of the aural surgeon. Dr. Bronner, of the Bradford Eye and Ear Hospital, goes so far as to assert that the resulting otitis, whether occurring during or subsequent to the specific attack, is typical, and differs in many ways from an ordinary otitis, both in respect to its symptoms and to its treatment. Mr. C. Atkin, at a meeting of the Sheffield Medico-Chirurgical Society on March 27th, also drew attention to the same condition, insisting more particularly upon the importance of prompt

treatment, by counter-irritation, and deprecating the use of the syringe, or the administration of quinine. Many other communications upon the same subject have appeared in the various journals, or have been addressed to the societies.

The inconveniences and even the dangers which arise from defective color perception are gradually being recognized by the community ; it is more than probable that similar inconveniences and dangers may follow **defective or perverted** functions in other of the organs of special sense, particularly those of **hearing.** We think, therefore, that Mr. F. E. Cane, of Liverpool, has done a service in drawing attention to the dangers arising, or likely to arise, from defective hearing in seamen, and his letter to the *British Medical Journal* on this subject, should receive the attention of the authorities.

In a recent number of the *Illustrated Medical News*, Mr. Bland Sutton gives a drawing of a **Supernumerary Tragus and Cervical Auricle** in a child of three weeks. The **malformation** was bi-lateral, the auricle consisting of a hard prominence, one third of an inch long, situated close to the anterior border of the sterno-mastoid, on a level with the cricoid cartilage. There were no branchial fistulæ. Mr. Sutton remarks that this is the first occasion on which he has found the double deformity.

Operative Interference with the Auditory Ossicles contained in the Middle Ear has hitherto been considered neither necessary nor advisable. An enterprising French aural surgeon has, however, devised an ingenious operation for releasing the stapes from any adhesions that may have been set up by recent inflammation, and claims to be able by this means to relieve or cure many of the most intractable forms of deafness. After making an incision in the membrana tympani, a delicate hook is inserted in the opening, and by this means the stapes is moved freely, or, if necessary, removed altogether. It appears doubtful, however, whether the effect of this very delicate, not to say dangerous proceeding, is any improvement upon the infinitely less risky action of the forcible Politzerization.

Tinnitus Aurium of Pelvic Origin.—It is perhaps difficult to see the connection between the female pelvic organs and the auditory mechanism. But Dr. Amand Routh quotes two cases in the *Provincial Medical Journal*, in both of which removal of uterine polypi was followed by the disappearance of pre-existing tinnitus, and on the strength of these cases argues that " Tinnitus

aurium seems able to be produced by irritation of the cervix." Surely this is an example of the "fallacy of arguing from the special to the general."

The question of the exact uses or **functions of the semi-circular canals** has again been brought prominently forward by the work of Professor Steiner, of Cologne. There seems, on the whole, to be a disposition to discredit the original, and one may almost say classical, views of Flourens and Ménière. Sir W. Dalby, too, has drawn attention to the fact, that as far back as 1873, his clinical experience had led him to doubt the existence of semi-circular lesions, in the majority of cases of auditory vertigo. Simple vertigo is induced by many slight brain lesions, and its association with deafness proves, according to Sir W. Dalby, no more than that the auditory nerve, or the auditory centre, has been interfered with; but such interference may have taken place at other points than in the semi-circular canals.

Education of the Deaf and Dumb.—This subject was recently discussed at a meeting of the Medical Institution of Liverpool. The attention of the members was directed by Dr. C. Macalister and Mr. C. G. Lee to the recommendation of the Royal Commission on the Deaf and Dumb, in which the adoption of the pure oral method is advocated. The first-mentioned gentleman maintained that owing to the time necessary to acquire it, and the small number of pupils that could be taught at one time, the lip system was adapted for the children of the upper classes only. Various members advanced the opinions that the superiority of the pure oral method was more imaginary than real; that when the deaf learned to speak, their intonation was exceedingly harsh and painful to listen to; and that lip reading, when acquired, was of little practical value as it seldom enabled the deaf to understand strangers, unless their enunciation of words was precise. Finally the meeting unanimously resolved that for the majority of the deaf the combined system was to be preferred to the purely oral method.

In a letter to the *British Medical Journal*, Mr. Charles G. Lee embodies the same opinions as were expressed at the above meeting, his main contention being that the oral system, when employed by itself, enables the deaf to converse with their most intimate friends only, and thus restricts their capacities for social intercourse.

The Royal Commission on the Deaf, Dumb, and Blind.—In a leading article, the *British Medical Journal* of September

28, 1889, gives a lucid and interesting summary of the recommendations of the above commission. The statistics of the deaf element in the population of the British Isles, as elicited in the inquiry, are worthy of notice. In 1861 the proportions were one deaf person in every 1,484 ; in 1871, one in every 1,742 ; and in 1881, one in 1,794. At the same time the attendance at school of the deaf has increased from 1,300 in 1851 to 3,138 in 1888. One fact of the highest importance adverted to in the leader in question is, that many children of 3, 5, or even 10 and 12 years of age, who have acquired speech before losing their hearing, are placed with deaf children, taught by signs, and thus become totally deaf and dumb. The commission insists on compulsory education, commencing at 8 and terminating at the age of 15, thus extending over a period of 8 years. As regards the methods of teaching the deaf, an exhaustive inquiry has been made, and it is unreservedly recommended that the "pure oral system" be universally adopted, to the exclusion of even the "combined method." In its editorial commentary the *British Medical Journal* points out that not long ago the number of pupils taught in England on the "pure oral" system was only a few score ; whereas now 1,563 are taught on the "pure oral," 545 on the "combined," and scarcely 1,000 on the "manual" and "sign and manual" systems taken together. The commission forcibly urges the creation of schools for the deaf and dumb, these institutions to be under its advice and authority ; while at the same time it insists, and rightly so, that state aid is more necessary for the training of teachers of the deaf and dumb than for the education of ordinary teachers in elementary schools.

Investigations as to the Hearing of School Children.—In the *British Medical Journal* for September 28, 1889, will be found a summary of the investigations of Dr. Thomas Barr as to the hearing power of pupils in Glasgow schools. Although the subject has been studied in America, France, and Germany, Dr. Barr's researches are the first of the kind carried out in Great Britain. The salient points embraced in his exhaustive contribution may be succinctly stated as follows : First, as illustrating the liability of children to ear diseases, it is recorded that of 3,436 persons treated at the Glasgow Ear Hospital during the past four years, 1,169, or 35 %, consisted of children under 15 years of age —"the time of life when speech and education are usually acquired." Dr. Barr examined in all 600 children, between the ages of 7 and 14, and equally divided as to sex ; these pupils, it

may be mentioned, were taken in equal numbers from two schools, representing children of nearly opposite social grades. Of the 600 children tested, 166, or 27.66 %. were found defective, either as regards one ear or both. By way of comparison it may be stated that the researches of Sexton (New York), Weil (Stuttgart), Moore (Bordeaux), and Bezold (Munich) have yielded respectively the following results, namely: 13.0, 33.37, 17.0, and 22.0 %. Dr. Barr, in the course of his examinations, established the fact that defective hearing was twice as frequent among the backward pupils as among those of apt capacities; and he proceeds to point out how defective hearing may militate against a pupil's educational progress, especially if intensified by indifferent mental powers and absence of home training. The frequent association of nasal with ear disease, and the injurious effects of colds in the head, arising from faulty ventilation in schools are dwelt upon in the paper in question; and the author sounds a timely note of warning against the reprehensible,—though it is to be hoped, not common practice,—of boxing pupils on the ears, a mode of punishment which is not only improper but may lead to fatal consequences, if inflicted upon a child already suffering from purulent ear disease. The most desirable sites for, and the methods of construction of, schools, most conducive to acoustic advantages are carefully discussed, and at the same time the vital importance of elocutionary excellence is insisted on. The neglect by the state of deaf children, and the superiority of the German, or "oral," system of teaching are referred to. Finally, Dr. Barr concludes a comprehensive and most instructive paper with suggestions to teachers and school architects of the highest practical value.

(4) **Pilocarpine in Deafness.**[1]—Mr. George P. Field, of London, subjected eighteen cases of labyrinthine deafness to subcutaneous injections of pilocarpine. The dose employed at the commencement of the treatment was an eighth or a tenth of a grain, and it was gradually increased, in some cases, up to a quarter of a grain. The injections were carried out daily, and ranged from twenty to forty in number. Mr. Field supplemented the hypodermic medication with the introduction into the tympanic cavity, through the Eustachian catheter, of a few drops of a weak solution of pilocarpine. The cases were not selected; in some the onset of the deafness had been sudden, in others, grad-

[1] *British Medical Journal*, March 2, 1889.

ual. The treatment was never continued longer than ten days, if no improvement was noted, as evidenced by the tuning-fork test. The results obtained were, in some instances, exceedingly good ; in others, bad, or indifferent. Politzer recommended the pilocarpin treatment in cases of pure labyrinthine deafness, of recent origin, and sudden invasion, especially when presumably due to syphilis ; in many of Mr. Field's cases, however, middle-ear disease was also present. The ages of his patients ranged from twenty-two to fifty-eight years.

In the *British Medical Journal* for August 3, 1889, Mr. Howard Barrett relates four cases of deafness which he submitted to hypodermic pilocarpine treatment. The ages of his patients varied from twenty-one to forty-five years, and the injections were continued in each case for six weeks. In three of his four cases considerable improvement was effected.

(5) **Intracranial Inflammations Starting in the Temporal Bone.**—This forms the subject of the Hunterian Lectures for 1889, delivered at the Royal College of Surgeons, London, by Mr. Arthur E. J. Barker, F.R.C.S., of University College Hospital. The achievements of Macewen, Godlee, Horsley, the author of these Hunterian Lectures, and others, have invested the intracranial complications of ear disease with an absorbing and ever-increasing interest, inasmuch as they have been the pioneers of modern brain-surgery. The Hunterian Lectures are three in number. Their subject-matter falls under three heads, namely, (1) the kind of mischief in the temporal bone likely to give rise to intra-cranial inflammations ; (2) the manner in which these inflammations are produced ; and (3) their differential diagnosis and treatment. In the first lecture Mr. Barker deals chiefly with chronic suppurations in the temporal bone, and the part played in these by micro-organisms. He refers to the observation of Zaufal that the streptococcus pyogenes is mainly, though not solely, concerned in the production of secondary intra-cranial complications of chronic otitis media, and that its presence in ear discharges must, therefore, be an unfavorable element in prognosis. Rohrer's researches in this direction are worthy of attentive consideration. He found that fetid contrasted very strongly with non-fetid discharges ; both cocci and bacilli being always found together in the former, but cocci only in the latter. He concluded that the various forms of bacilli present in fetid discharges were not *pathogenic*, but simply *saprophytic ;* the cocci, on the other

hand, were typical pathogenic. Mr. Barker holds that too much importance should not be attached to fetor in pus from the ear, inasmuch as he has met with some of the most dangerous intra-cranial sequelæ of ear disease where the secretions from the tympanum were nearly, or quite, ordorless. This apparent anomaly finds an explanation in Rohrer's observation regarding the pathogenic nature of the cocci found alone in non-fetid pus, and the merely saprophytic character of the bacilli which preponderate in fetid discharges. As suggested by Zaufal, cultivations of ear-discharges may in the future afford considerable help in forming a prognosis. Assuming that micro-organisms are concerned in the production of intra-cranial sequelæ of ear-disease, their modes of access to the interior of the skull are next discussed. That their ingress is a direct one is proved by the fact that intra-cranial inflammation of tympanic origin is almost invariably on the same side as the affected ear. Mr. Barker suggests that bacteriology may be of great assistance in explaining those very anomalous instances in which ear-suppuration gives rise to a deeply-seated abscess in the brain, or the cerebellum, the brain substance intervening between the abscess and the ear being, to all appearance, quite normal. Small veins can be demonstrated passing from the anterior surface of the cerebellum, and external surface of the temporal lobe, either to the superior petrosal sinus, or to the dura mater about the tympanic roof. Septic phlebitis is probably set up in venous radicles running from the walls of the tympanum to the superior petrosal and lateral sinuses, and from these inflamed radicles, or a contiguous thrombosis, septic organisms may easily find entrance into the veins already mentioned as passing to the surfaces of the brain and cerebellum, and by a very slight reflex, or backward extension of a thrombus in a direction contrary to the blood-current, these organisms may set up disease in the substance of the encephalon, without extending to its surface.

In the second lecture Mr. Barker deals in the first place with the statistics of mortality from purulent middle-ear disease, derived from the Tables of Bürkner and Bezold, and from the records of University College Hospital. This mortality he places at 2½ per cent. It appears that at three London hospitals, namely, University, Middlesex, and Great Ormond Street Sick Children's Hospital, the deaths attributed to complications of ear disease, during a period of twelve years, numbered only *forty-five*, and this

out of an aggregate of 8,028 deaths from all causes. As regards the relative frequency of the various intra-cranical complications of suppuration in the temporal bone, it is found that the sequelæ most to be dreaded are meningitis and pyæmia; cerebral and cerebellar abscesses constituting but a small proportion of the forty-five deaths analyzed, 34 were attributed to meningitis and pyæmia taken together, and only 9 to cerebral and cerebellar abscess alone. The ages of the subjects of intra-cranial inflammations exhibit a "perfect parallelism," to use Mr. Barker's words, with the incidence of primary suppurative diseases of the middle ear; of 2,522 consecutive cases of purulent disease of the middle ear seen by Bezold, 30 per cent. were children, and 70 per cent. adults; and of 37 cases of intra-cranial complications of ear disease, occurring in two London hospitals, 11 were below fifteen years, and 26 above that age; that is, 30 and 70 per cent. respectively. The various symptoms of the several complications of suppurative ear disease are passed in review, and their diagnostic value carefully estimated. The temperature affords most valuable indications as to the nature of the lesion in any particular instance, although here difficulty often arises from the fact that any one complication seldom occurs alone. In cerebral abscess the primary rise is usually succeeded by a steady fall until the abscess is well formed; thereafter the chart exhibits daily records of a normal or sub-normal character. Finally, Mr. Barker is not disposed to place much reliance upon symptoms as aids to differential diagnosis. He believes that we are more likely to arrive at safe conclusions regarding the nature of the intra-cranial lesion, or lesions, from a careful study of the primary ear-affection from which they spring, and from a knowledge of their pathology as acquired from post-mortem observations.

The third lecture is mainly occupied with treatment, the various diseases being individually considered. A rigid prophylaxis is insisted upon, in view of the fact that suppurative otitis media can, under strict antiseptic methods, usually be arrested. The annals of recent surgery show that operations for intra-cranial complications of ear disease have been eminently successful, and have saved the lives of many patients. Even cerebellar abscess, which was formerly considered beyond the reach of the surgeon, has now been brought within the range of brain surgery by the brilliant achievement of Macewen of Glasgow, who recently evacuated four ounces of pus from a cerebellar abscess,

in a moribund patient. In the operation for cerebral abscess, Mr. Barker has introduced into his practice a modification of the usual procedure. Instead of the large trephine commonly employed he has adopted one of one-quarter inch size. Through the small aperture thus formed he is able to explore the whole of the suspected area with a hollow needle, this preliminary being rendered easy in the small opening made in the bone by the thinness of this structure at the spot selected for operation. Further advantages resulting from the use of the small trephine, and the limited incision in the soft parts which it demands, are that hemorrhage is reduced to a minimum (a matter of no small importance in a weakly patient), and that hernia cerebri is less likely to occur. But with regard to the latter accident, Mr. Barker states that even with the large trephine its supervention is extremely infrequent, owing to the systematic antiseptic measures employed. With the small trephine the lateral sinus is less likely to be injured. As regards drain-tubes he prefers, both for the brain and cerebellum, those made of silver; an old silver catheter, heated to redness to render it aseptic, answers the purpose admirably. Of the various dressings in use gauzes prepared with sal alembroth are preferred, these being put on moist and covered with oiled silk. For the irrigation of abscess-cavities boracic acid is employed. Summing up the achievements of cerebral surgery, reference is made to operations for meningeal inflammation and exudation. The first case of the kind occurred in Mr. Barker's own practice, and was fully detailed by him in the *British Medical Journal* for 1888. The diagnosis was founded upon a careful study of the initial lesion in the ear, and the clinical symptoms of the cerebral condition. He operated on the hypothesis that a collection of fluid existed in, or contiguous to, the fissure of Sylvius, the patient being moribund, comatose, more or less hemiplegic, and with a pulse of thirty-six. A thin fluid was evacuated, and recovery was complete, the patient being shown to his audience by Mr. Barker during the delivery of his third Hunterian lecture.

Altogether Mr. Barker's Hunterian lectures present us with one of the most valuable contributions to cerebral surgery. Based upon his own extensive and successful experience, and the labors of other workers in the same field, they form a masterly exposition of results achieved, and future potentialities, while at the same time they afford clinical and operative indications of the highest value.

New Instruments and Appliances.—Messrs. Burroughs, Wellcome & Co., at the suggestion apparently of Dr. Macnaughton Jones, have devised an ingenious method for the introduction of medicated vapors into the recess of the middle ear. Their "Aural Vapowls" consist of a thin glass capsule containing the volatile substance, and this is surrounded by cotton wool; the capsules are crushed between the finger and thumb and are then inserted whole into the external meatus. We must confess that the principles involved in the use of this and similar forms of apparatus, appear to us to be of very doubtful value; we cannot view without some alarm the proposal to introduce into the external meatus a foreign body consisting of wool and minute pieces of glass. If the "vapowl" is intended for the use of the patient, the proposal is doubly dangerous, while the therapeutic efficacy of the procedure is seriously impaired if they are intended only for the use of the surgeon at irregular, or at best, at long intervals. The same remarks would apply to the "Aural Probe," introduced by Dr. Ward Cousins, of Southsea. This ingenious instrument consists of a probe and sliding collar at one end, and a pair of forceps at the other, and was, apparently, devised by Dr. Cousins in connection with his recently-introduced antiseptic drumhead.

The inhaler suggested by Dr. Smith of the Cheltenham Eye, Ear, and Throat Infirmary is perhaps worthy of notice, because of the ingenious reversal of the usual principles upon which these instruments are constructed. Dr. Smith, proposes to blow air through the inhaler by a mouthpiece, and allow it to pass into the nose by a nosepiece, down one nostril and out of the other, opening and closing the nostril of exit intermittently.

REPORT ON THE PROGRESS OF OTOLOGY DURING THE FIRST HALF OF THE YEAR 1889.

II.—PATHOLOGY AND THERAPEUTICS.

(Concluded from page 75.)

By A. HARTMANN, Berlin.

Translated by Dr. Max Toeplitz, New York.

NERVOUS APPARATUS.

48. Moure, E. J., Bordeaux. Incomplete unilateral deafness following mumps (Surdité unilatérale incomplète consécutive aux oreillons). *Annales de la Polyclinique de Bordeaux*, vol. i., No. 1.

49. Minos, M. Intense deafness in late hereditary syphilis (De la surdité profonde de la syphilis héréditaire tardive). *France Méd.*, 1889, No. 6.

50. Schmidt, H. A case of injury to the head associated with stuttering and hardness of hearing. *Deutsche Militär Zeitschr*, 1889, No. 6.

48. Moure reports two cases of deafness in mumps; in both, only one ear was affected with but incomplete deafness. Moure believes to be justified in diagnosticating an affection of the middle ear from the examination of hearing, although the usual treatment proved to be completely inefficacious and the examination of the drum-membrane and of the tympanic cavity did not reveal any pathological changes.

49. Minos discusses the various views of the authors upon this subject and agrees with Fournier. The disease is most frequently observed in childhood, especially in the female sex: the relations to syphilis are incontestable. Certainly the affection

does not seem to implicate the peripheral organs. According to Kipp one would be tempted to believe in an affection of the floor of the fourth ventricle, as an explanation for the bi-lateral seat of the disturbances of hearing. The deafness is, indeed, usually bi-lateral ; it appears most frequently without preliminary symptoms ; according to other observations, headache, vomiting, nausea and vertigo were present ; no pain. The disease takes a rapid course and is frequently associated with tinnitus. The prognosis is unfavorable for the hearing faculty. The diagnosis results from the other syphilitic symptoms. Topical and specific treatment is of no avail. G. GELLÉ.

50. A hussar was kicked by a horse upon the left frontal region. When admitted to the hospital shortly after the accident, no wound or swelling was visible. Aphasia, deafness in the left ear and paralysis of the right arm were present. The latter disappeared during the following three days. After four days the patient spoke single words, stuttering markedly ; after four weeks all words, still stuttering. The drum-membrane and tympanic cavity appeared to be normal ; the tuning fork was perceived in the right ear. The hearing power improved gradually to such an extent that the watch could be heard in contact with the ear. The patient was discharged in this condition. With reference to the disturbance of speech and motility, the author believes for various reasons in an injury in the region of Broca's convolution, caused by *contrecoup*. He refers the disturbance of hearing to a commotion of the labyrinth for the following reasons : a peripheral cause is *à priori* to be excluded, as well as a lesion of the base and a central location, since no disturbance of other cerebral nerves took place. There remains only the diagnosis of a commotion, since, according to Schwartze, increase of deafness indicates an effusion into the labyrinth, spontaneous decrease a commotion.

NOSE AND NASO-PHARYNX.

51. POTIQUET, Paris. Critical study of caseous coryza (Étude critique sur le coryza caséeux). *Gaz. des hôpit.*, 1889., Feb., 2nd.

52. SCHUCHARDT, CARL. The nature of ozæna, with some remarks on epithelial metaplasia. *Volkmann's Sammlung klin. Vortr.*, No. 340.

53. SCHIFFERS, Liége. Erysipelas of the nasal fossæ (De l'erysipèle des fosses nasales). *Revue mens. de laryngol*, etc., 1889, No. 5.

54. GOMPERZ, B., Vienna. A case of soft papillary fibroma of the lower turbinated body associated with otitis media hyperplastica. *Monatsschr f. Ohrenh.*, etc., 1889, No. 2.

55. MODRZEJEWSKI, Warsaw. Complete stenosis of the nasal cavities. *Gazeta lekarska*, 1889, No. 16.

56. WAGNIER. Lille. A modification on the use of the galvano-cautery loop for the removal of polypi of the posterior extremities of the nasal fossæ. *Revue mens. de laryngol.*, etc., 1889, No. 12.

57. SCHULTEN, Helsingfors. Some remarks on epistaxis and its treatment. *Finska läkaresällskapits Handlinger*, 1888, No. 4.

58. HAJEK, M., Vienna. Tuberculosis of the nasal mucous membrane. Published by Wilh. Braumüller, Vienna.

59. RYDIGIER, Cracow. Rhinoscleroma Przeglad lekarski, 1889, No. 26.

60. DITTRICH, PAUL. Contribution to the etiology of rhinoscleroma. *Centralbl. f. Bacteriol. u. Parasitenk.*, 1889, No. 5.

61. BALL, JAMES J. Intranasal diseases and asthma. *The Practitioner*, 1889, No. 6.

62. KÜSTER, E. The principles of treatment in suppurations of bone cavities, with especial reference to empyema of the pleura. *Deutsche med. Wochenschr.*, 1889, No. 10 and *ff*.

63. LABIT, G. A case of purulent catarrh of the frontal sinuses following the removal of polypi (Sur un cas de catarrhe purulent des sinus frontaux consécutifs à l'ablation de polypes). *Annales de la Polyclinique de Bordeaux*, vol. i., No. 1.

64. SIEBENMANN, F. A second case of mould mycosis at the roof of the pharynx. *Monatsschr. f. Ohrenheilk.*, 1889, No. 4.

65. GELLÉ. Burse pharyngée. *Soç. de biologie*, April 13, 1889.

66. SIEBENMANN, F., Bâle. Chronic catarrh of the naso-pharyngeal cavity and bursa pharyngea. *Correspondenzbl. f. Schweiz. Aerzte.*, 1889, No. 12.

67. KAFEMANN, R., Koenigsburg, Pr. Catarrh of the recessus pharyngeus medius (Bursa pharyngea—Tornwaldt's disease),

its importance and simplified surgical treatment. Published by J. F. Bergmann, Wiesbaden, 1889.

68. RANGÉ, PAUL, Nices. Tornwaldt's disease and the bursa pharyngea (La maladie de Tornwaldt et la bourse pharyngée). *Bulletin med.*, 1889, No. 4.

69. BARBON, L. Adenoid vegetations of the naso-pharynx (Des végetations adénoides du pharynx nasal). *Gazette des hôpit.*, 1889, No. 67.

51. POTIQUET fully discusses the disease, which has been frequently described as caseous coryza, and, on account of personal and other observations, he arrives at the following conclusions: (1) The disease, described by Duplay as caseous coryza, does not constitute a distinct type. It is an artificial conception, comprising different diseases. (2) The observations communicated up to date under the name coryza caseosa, refer to diseased follicular (caseous) cysts of the superior maxilla, which had perforated into the nose, or to cases of foreign bodies followed by accumulation of epithelial masses and pus corpuscules, or to syphilitic gummata in the state of disintegration, or to cases of chronic suppuration of the nasal cavity. (3) Cheesy deposits, which, moreover, have been quite rarely observed, should retain their place in the nosology of the nose in spite of the different origin and composition. They form no distinct disease, but a symptom complex. (4) The history, the objective and subjective symptoms, the microscopical examination of the cheesy masses, and principally rhinoscopy, should aid in arriving at the correct diagnosis.

52. SCHUCHARDT considers the prevalent theories upon the nature and genesis of ozæna as thoroughly unsatisfactory, on account of Netter's investigations, who, in a large number of cases of endometritis, could demonstrate the transformation of cylindrical epithelium into pavement epithelium, and also an atrophic mucous membrane and an extremely offensive odor, furthermore, on account of a similar condition in other affections of mucous membranes, *e.g.*, those of the middle ear, trachea, etc. Schuchardt, in patients suffering from ozæna, scraped off with the sharp spoon pieces from the upper portions of the nose, and examined them microscopically. The mucous membrane was found in all cases to be atrophied, consisting partly of granulation tissue, partly of cicatricial tissue, and covered by ten or twelve layers of partly horny pavement epithelia. Schuchardt, on account of this anatomical result of examination, believes

himself to be justified in concluding that ozæna invariably depends upon metaplasia of cylindrical epithelium into pavement epithelium. He considers the excessive formation of pavement epithelium as the cause of the offensive odor. According to the reviewer's opinion, the metaplasia can only be considered as a secondary phenomenon. The usual odor may arise from the ozæna bacillus, cultivated by Rohrer, *a. o.*

53. SCHIFFERS reports a case of nasal erysipelas. His treatment consisted in irrigations with a solution of sublimate of one to four thousand.

54. GOMPERZ describes the removal of a papillary tumor, which was remarkable for its considerable size, for the comparitively slight symptoms, and also for its histological structure. The tumor was of the size of a hen's egg, and its microscopical examination revealed the appearance of a soft, œdematous fibroma. No glands were found in the tumor, and no growth of epithelia. It was removed by a galvano-cautery snare, similar to Gruber's aural instrument.

55. MODRZEJEWSKI describes two cases of *lues hereditaria* in children surgically treated. In the first case the left nostril was grown together; in the second case, both nostrils. The occlusion began 1 *cm* from the introitus. The treatment consisted in destruction of the anterior membrane with the galvano-cautery and in introduction of a thick, bulbous probe. In the first case, the nose was subsequently treated with laminaria digitata; in the second case, it was dilated with elastic bougies. Later, permanent drainage-tubes were introduced. The result in both cases was a good one. SREBERNY.

56. WAGNIER, in three cases of nasal polypi which extended into the naso-pharynx, succeeded in removing them in the following manner: He places a wire snare, which is connected with the galvano-cautery battery, around the lower portion of the polypus, heats it in order to obtain a firm point of support, and then withdrawing the cold snare, tears off the polypus.

57. SCHULTEN reports upon the treatment of epistaxis from the cartilaginous system by means of fuming nitric acid, and advocates the anterior plugging with iodoformized cotton in contradistinction to the treatment of cases of bleeding from the deeper portions of the nose. VICTOR BREMER.

58. HAJEK, on account of personal and other observations, lays down general indications for diagnosis, course, and treatment

of this rare affection. He introduces the paper with a synopsis of twenty-seven observations gathered from literature. The author is convinced that the localization of tuberculosis in the nose is not quite as rare as it is generally believed, since we make use of histological and bacteriological examination. This is all the more intelligible because the latter requires great patience and pains. In addition to this, the negative result of examination for tubercle bacilli is of no value, since in some cases of undoubted tuberculosis no bacilli are found. It is important to examine deep-seated portions and to thoroughly investigate the specimens. The histological examination does not in all cases give a characteristic result. The affection appears mostly as a combination of tumors and ulcers, rarely of isolated ulcers, and of tumors alone only in the beginning. The tumors varying in size from a millet-seed to that of a walnut, are mostly situated upon the septum ; they disintegrate and extend so far as to perforate ; in their surroundings miliary tubercles are occasionally seen. In addition to the tumors, diffuse affections due to confluence of disintegrated groups of nodules are seen. The symptoms consist of difficulty in breathing, not necessarily with any disturbance of the general health. With reference to the differential diagnosis, syphilis should first of all be taken into consideration. Histological and bacteriological examinations are indispensable in cases in which the history and the remaining condition of the tissue do not throw any light upon the subject. The diagnosis is all the more difficult in young people. Whereas formerly in these cases hereditary syphilitic ozæna and coryza was invariably diagnosticated, the author has proved in two among eight cases the tuberculous character of the disease. With reference to the relation of the disease to lupus the author emphasizes the histological identity of the latter with tuberculosis. It is not justifiable, he says, to consider the tuberculous affection of the nasal mucous membrane as lupus in cases in which lupus of the external nose develops in consequence of indubitable tuberculosis of the nasal mucous membrane. These cases prove that the same virus may appear in a different way upon the mucous membrane and upon the skin. Whether the affection may also occur as a primary one, is difficult to decide. Its course is chronic, and it lasts for years. The treatment should tend to a radical removal of all diseased portions, but its success is usually only temporary since relapses occur as a rule after weeks or months.

59. At the eighteenth surgical congress at Berlin, RYDIGIER demonstrated two cases. The first case was a woman, who exhibited an almost complete obstruction of both nostrils. There were upon the hard and soft palate numerous cicatrices, the pillars were much contracted, and the soft palate was attached to the posterior pharyngeal wall. In the second case of a young man considerable changes of the septum were present (no particulars were given.—*Rev.*), together with a granular appearance of the hard and soft palate, and also with hard tumors of the size of a hazel-nut, upon the posterior surface of the soft palate. Nasal respiration was impeded, the faculty of smelling absent, and the hearing power much decreased. In spite of the long-continued hoarseness, no scleromatous changes were found in the larynx. The author intends to remove radically the diseased portions, since the scraping and cauterizing performed several years ago by Mikulicz had been without success. At the conclusion the author points out the following characteristics, which distinguish the bacilli of rhinoscleroma from those of pneumonia: (1) The cultures of the former grow more slowly than those of the latter. (2) The cultures of the bacilli of rhinoscleroma grow uniformly upon agar, and show a gray opalescent surface, while those of the pneumonia bacilli exhibit an uneven surface and are less transparent. (3) The former show a more distinct and marked lustre which, in the latter, is plainly visible only upon the margins.

SREBERNY.

60. DITTRICH reports an additional case of rhinoscleroma in a woman, æt. thirty-seven. Two hard nasal tumors, causing wellnigh complete obstruction of the nasal respiration, had been removed with good success. In October, 1888, one year after the first operation, Gussenbauer removed additional tumors with the same success. The examination revealed, apart from dense, small cellular infiltration and lacunæ of the connective tissue, the presence of numerous Mikulicz's cells, which contained the bacilli of rhinoscleroma. Culture experiments determined the presence of rhinoscleroma bacilli, although the inoculating experiments failed completely, the author is convinced, that this disease is caused by the discovered bacilli.

61. BALL argues, that in by far the greatest number of cases asthma is due to nasal affection. The patient ought to be questioned in this direction. According to his experience a negative result will be an exception, and this only in inveterate asthmatics.

62. According to his above-mentioned rules for the treatment of suppuration in bone cavities KÜSTER, recommends in empyema of the Highmore's antrum the subperiosteal resection of the anterior wall of the cavity, after preceding cocainization. The opening should be large enough to allow the small finger to be introduced in order to explore the cavity. The cavity is once thoroughly irrigated and then plugged with loose iodoformized gauze. Afterwards, drainage-tubes are introduced. Irrigations are not necessary: "The only objection to this procedure is the possibility of the entrance of food, although this is not as frequent as is assumed. It is, at any rate, unpleasant that a permanent opening into the Highmore's antrum occasionally remains."

63. LABIT narrates a case in which, after removal of polypi, suppuration from the frontal sinus took place. When examined with the probe necrosis was found *at* the entrance into the frontal sinus. The discharge could be diminished by irrigations of the frontal sinus.

64. SIEBENMANN found at the autopsy of a syphilitic woman, apart from extensive destruction in the nose, a crust covered with a grayish-green and whitish-spotted mould-mass. The grayish-green places contained enormous cultures partly of aspergillus fumigatus partly of aspergillus nidulans. The whitish turf represented pure cultures of well-developed, ripe mucor corymbifer. The mould-formation had existed at least for several weeks.

65. GELLÉ demonstrated a specimen of a pharynx with a well-marked bursa pharyngea. He gives an historical synopsis of the question, and pointing out that the bursa is not always present, which accounts for the view of other authors, as, *e.g.*, D. Rangé's, who have of late still doubted its existence. The bursa occurs and Tornwaldt's disease cannot be denied. G. GELLÉ.

66. After some preliminary remarks upon the atrophic form of nasal catarrh, the author treats of the hypertrophic form. Hypertrophies of the posterior ends of the turbinated bodies and of the septum and swelling of the cavernous tissue are associated even with the less severe forms. The pharyngeal tonsil is most frequently affected and its anatomical relations are given in full. With reference to the bursa pharyngea SIEBENMANN, on account of his investigations in fifty autopsies of persons from twenty to seventy years of age, arrives at the conclusion that the bursa does not occur in the manner described by Meyer, Luschka, Tornwaldt and Mégevaud. The increase of discharge is produced by

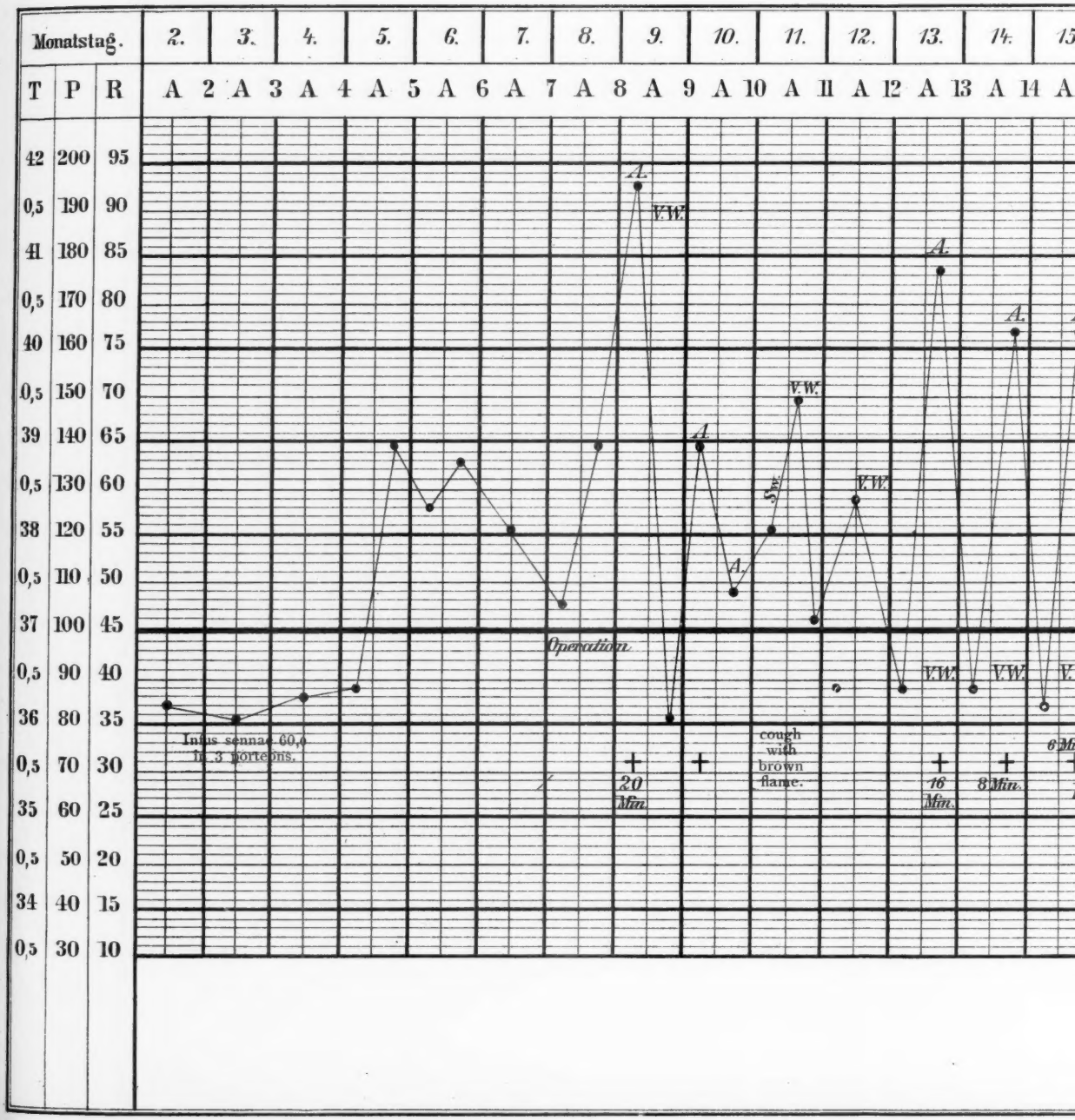
the entire surface of the tonsil, and not only by a "bursa pharyngea," or by the recessus medius. Precisely in extreme hypertrophies the large lacunæ are absent at the posterior margin of the tonsil, whereas in small hypertrophies a deep recessus medius frequently occurs. Cysts of the tonsil are found in more than one third of the cases. The only correct treatment consists in the operative removal of the hypertrophied tonsil, which the author recommends even for the smaller degrees. Gottstein's ring-knife was most satisfactory to Siebenmann. He places during the operation the patient's head under his left arm, placing himself on the right; "like the dentist in extracting the teeth of the left side." He never uses chloroform. Nasal complications disappear in most cases spontaneously after the operation. Large hypertrophies are removed anteriorly with the cold snare. In some cases the author believed the peculiar fever attacks in small children, which lasted from one to two days, to be due to the existence of adenoid vegetation.

67. KAFEMANN, while anatomtically entertaining the same views with Schwabach and Suchanneck, clinically agrees with the well-known views of Tornwaldt, and recommends radical operation of this disease, which is associated with considerable symptoms and is not quite rare in northern climates. He uses a sharp spoon made according to Trautmann, for the removal of the diseased recessus medius at several sittings, which he cauterizes afterwards with nitrate of silver or chromic acid. The results were quite satisfactory as can be judged from the full report of ten histories, which were communicated at the conclusion of the paper.

68. RANGÉ gives, in the introduction to this paper, a synopsis of the literature upon the bursa pharyngea and its pathology and, on account of his observations upon patients having healthy and pathological naso-pharynx, and also on account of examinations in autopsies, arrives at the opinion that there is no bursa pharyngea, as described by Tornwaldt.

69. Among the numerous instruments for the removal of adenoid vegetations, BARBON prefers the forceps of Loewenberg, Woakes, and Delstanche; among the methods of their application he considers that of M. Calmettes to be the best (*Gazette Médicale*, June, 1887), who removes radically in superficial chloroform narcoses all adenoid tissue at one sitting.

April 1889.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Fiebercurve.

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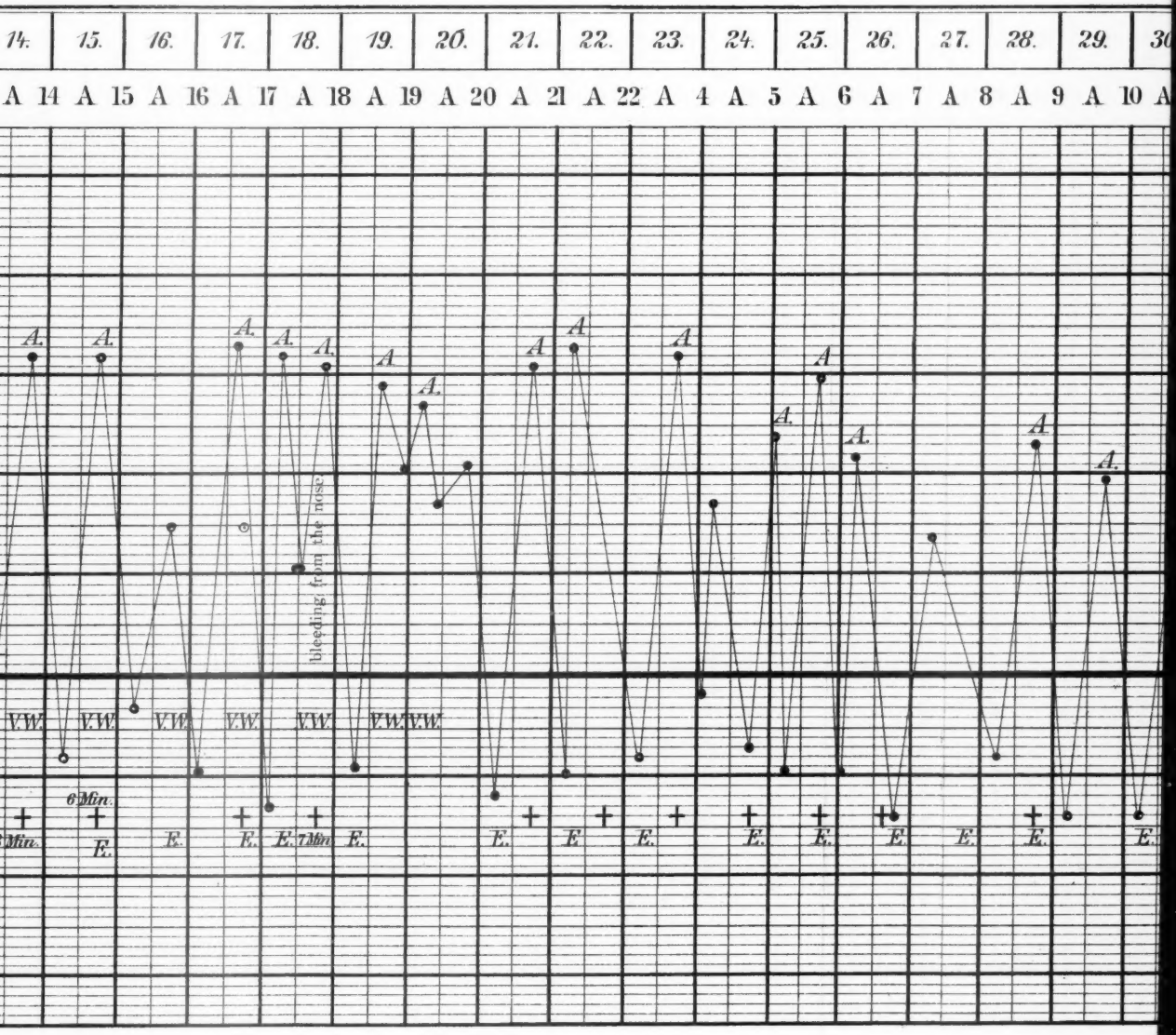


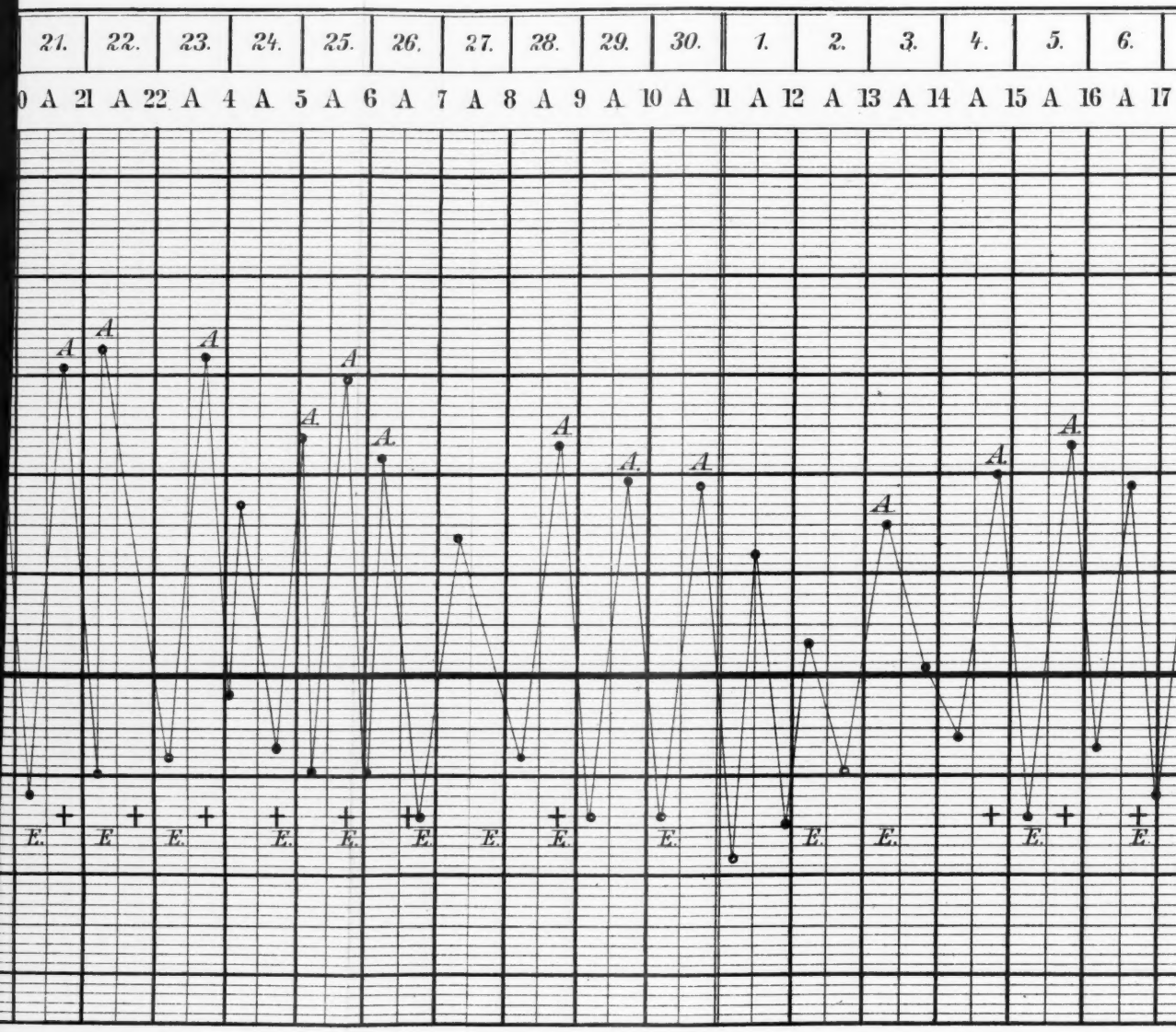
Sw. = Sweat.
A. = Antipyrin 1,0 gramm.
VW = Change of the bandage.

E. = clyster.
+ = severe chill.
Min. = Minute.

Fiebercurve.

Name of the patient: W. L., 49 J.

May 1889.



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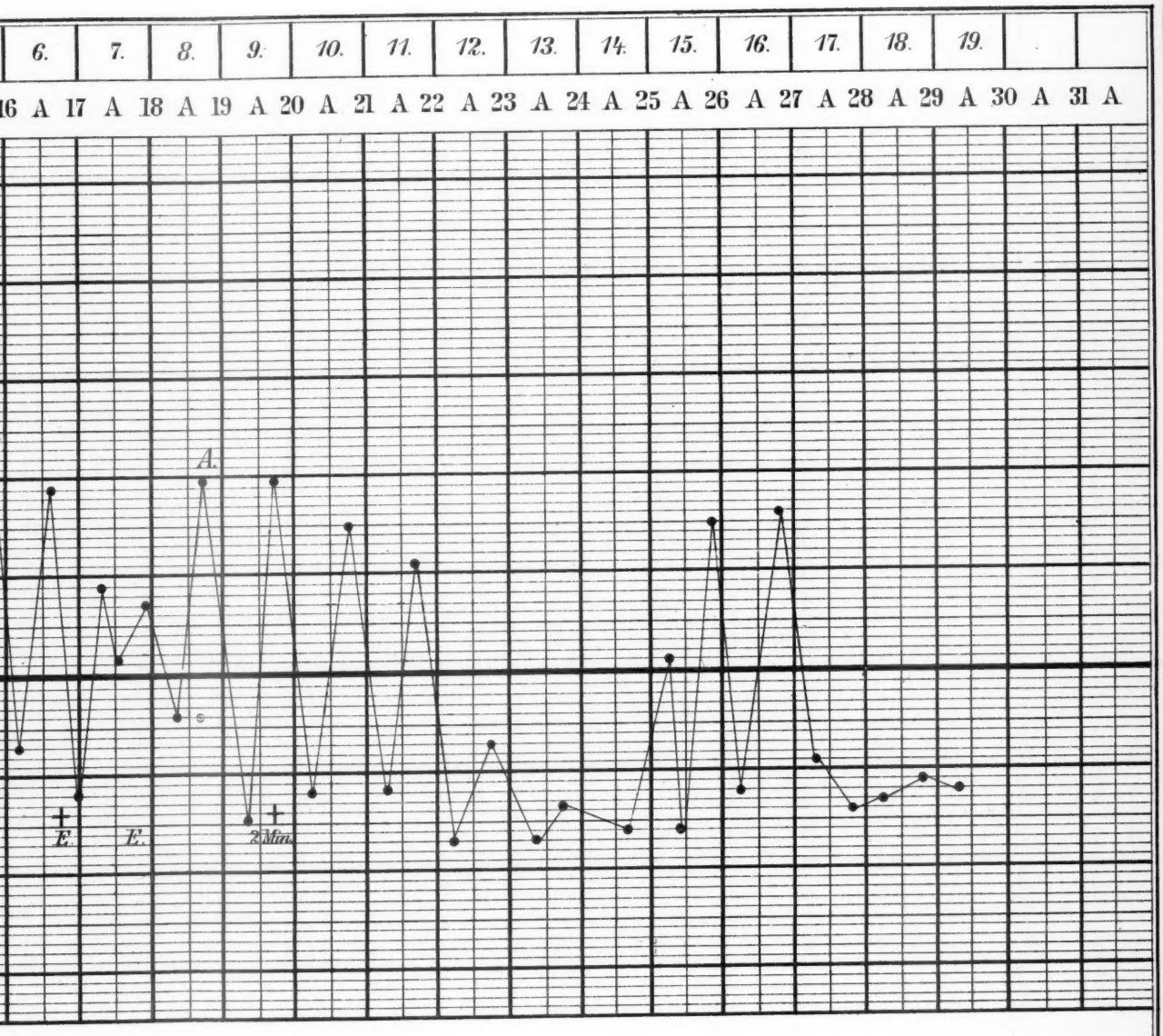
+ = severe chill.
Min. = Minute.



Kgl. Univers. Druckerei v. H. Stürtz, Würzburg.

MISCELLANEOUS NEWS.

A course of six practical demonstrations on diseases of the ear has been successfully carried out by Dr. Milligan at the Manchester Ear Institution. We still regret to note that the London Post-Graduate Course does not yet include lectures or demonstrations upon otology; this is the more curious because the President, Mr. Jonathan Hutchinson, in his "Archives of Surgery," now publishing, devotes a section to the consideration of "Diseases of the Ear," and the cases with which he illustrates his remarks are, we think, at once indicative of the importance of the subject and of the necessity for further instruction.

The Newcastle-on-Tyne Deaf and Dumb Institution has benefited to the extent of £1,500, through the munificence of the late J. Fleming, Esq., who has also bequeathed other and larger sums to various local charities.

APPOINTMENTS.

HENRY MCSAGAN M.B., has been appointed Resident Ophthalmic Officer with the charge of the Aural Department at the Leeds General Infirmary.

W. B. DE JERSEY, B.A. (Cantab.), S.R.C.P., M.R.C.S., has been appointed Clinical Assistant for Diseases of the Ear, at St. Thomas's Hospital.

G. H. WICKHAM, B.A. (Cantab.), S.R.C.P., M.R.C.S., has been re-appointed Clinical Assistant for Diseases of the Ear, at St. Thomas's Hospital.

At a dinner at the Hotel Metropole on May 12th, in aid of the funds of the "Association for the Oral Instruction of the Deaf and Dumb," the Lord Mayor (Sir Henry Isaacs) presiding, donations to the extent of £2,000 were announced.

At the recent conference of those interested in the instruction of the deaf and dumb, a paper on "Training Colleges for Teachers," read by Mr. Harry W. White, gave rise to much discussion. This paper, together with a report of the discussion which followed, has now been issued in pamphlet form, and will amply repay careful perusal.

We are pleased to be able to inform our readers that it has been publicly announced in Parliament that the Government have prepared, or are preparing, bills for England, Scotland and Ireland respectively, in accordance with the suggestions contained in the report of the Royal Commission on the Deaf and Dumb. This should be a source of much congratulation, especially in the contrast afforded by the cavalier treatment of the Commission on the Army Medical Service.

British Medical Association. The Annual Meeting will be held at Birmingham from July 29th to August 1st. In the Section of Otology, the office-bearers are: President, C. Warden, Esq., M.D. (Birmingham); Vice-president, G. W. Hill, Esq., M.D. (London); Hon. Secretary, R. K. Johnston, Esq., M.D., 22 Lower Baggot Street, Dublin.

CONTENTS OF VOLUME XIX., NUMBERS 2 AND 3.

NOTICE TO CONTRIBUTORS.

The editors and publishers of the ARCHIVES beg to offer some suggestions to authors who propose to favor them with their contributions.

1. As original communications the ARCHIVES can accept only such papers as have never been printed nor are intended to be printed in other journals. If a preliminary communication on the subject of a paper has been published, the author is requested to state this in the letter accompanying his manuscript. It is understood that contributors to these ARCHIVES and editors of other periodicals will make no abstracts of the original papers published in this journal without giving it due credit for the same.

2. Authors will receive gratuitously twenty-five reprints of their articles. If a greater number is desired,—notice of which should be given at the head of the manuscript,—only the additional cost of presswork and paper will be charged to the author.

3. In preparing manuscript for the compositor it is requested that the following rules be adhered to:

a. Write on one side of the paper only.

b. Write without breaks, *i. e.* do not begin a new sentence on a new line. When you want to begin a new line or paragraph at a given word, place before it in your MS. the sign ¶.

c. Draw a line along the margin of such paragraphs as should be printed in smaller type—for instance, all that is clinical history in reports of cases, etc.

d. Words to be printed in *italics*, should be underscored once, in SMALL CAPITALS twice, in LARGE CAPITALS three times.

4. Authors may receive proofs for revision if they will kindly return them without delay. We beg however to remind our contributors that changes in the copy are equivalent to resetting, causing so much additional expense. We therefore request them, to make, if possible, no alterations at all in their MSS., or, at least, to limit these to what is of essential importance

CONTENTS OF VOLUME XIX, NUMBER 4.

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